1995

# Accommodating coastal-dependent and coastal-related land use on the central California coast

John Allen Chamberlain
*San Jose State University*

# ACCOMMODATING COASTAL-DEPENDENT AND COASTAL-RELATED LAND USE ON THE CENTRAL CALIFORNIA COAST

A Thesis

Presented to

The Faculty of the Department of Environmental Studies

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

by

John Allen Chamberlain

May 1995

APPROVED FOR THE DEPARTMENT OF ENVIRONMENTAL STUDIES

Dr. Gary Klee, Committee Chairman
Professor of Environmental Studies

Dr. Lester Rowntree
Professor of Environmental Studies

Mr. Les Strnad, Assistant District Manager
California Coastal Commission—Central Coast District

APPROVED FOR THE UNIVERSITY

ABSTRACT

ACCOMMODATING COASTAL-DEPENDENT AND
COASTAL-RELATED LAND USE ON THE CENTRAL CALIFORNIA COAST

by John A. Chamberlain

This thesis considers whether certain coastal-dependent land uses can be accommodated, both from a policy and a geophysical perspective, along the central California coast near Monterey. Of interest are coastal-dependent marine research, education, and mariculture operations. The study area was chosen for its proximity to existing and potential locations for marine research and the Monterey Bay National Marine Sanctuary.

An analysis of shoreline areas along a 75-mile lateral extent was performed. Jurisdictional and environmental analyses utilized land use documents, resource maps, government publications, aerial photography, and on-site observations. Operational constraints for coastal-dependent facilities were also considered.

Functional site areas that can accommodate large research and educational coastal-dependent uses are present. The buildout potential on existing properties is low, and undeveloped parcels appropriate for these land uses are few. The research also shows a need for (1) a uniform definition of coastal-dependent land use, (2) collaborative efforts between education, government, and industry, and (3) a greater-than-local perspective instilled into local coastal programs.

ACKNOWLEDGMENTS

This thesis would not have been possible without the support and encouragement of various individuals. I would like to thank my parents, Stan and Gloria Chamberlain, for their emotional and financial support throughout the seemingly endless process of thesis writing. Also, years of post-graduate work have been successful largely due to the advisement and direction of Dr. Gary Klee, the environmental studies department graduate advisor. During the course of the research and writing of this thesis, special recognition and gratitude is extended to Mr. Les Strnad of the California Coastal Commission. His encouragement, knowledge and wisdom, both personally and professionally, has been instrumental in the successful completion of this work. I would also like to recognize the efforts of Ms. Joanne Clark for her dedication to and skillful execution of word processing and report formatting for the entire manuscript. Lastly, the professional quality of each of the figures and illustrations in this report would not have been possible without the special attention and skillful craftwork of Ms. Linda Hawke-Gerrans and Mr. Lee Gerrans.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

LIST OF FIGURES (Continued)

LIST OF TABLES

## GLOSSARY

Aquaculture – Controlled production of aquatic resources

Biosphere – Layer nearest earth's surface that sustains organic activity

BPMG – Branch of Pacific Marine Geology

CCC – California Coastal Commission

CDFG – California Department of Fish and Game

COAP – Center for Ocean Analysis and Prediction

Coastal-dependent – An activity which requires coastal access in order to function

Coastal-related – An activity that directly supports coastal-dependent land use

Coastal zone – Jurisdictional boundary where coastal influences occur

CZM – Coastal Zone Management

EMIS – Environmental Management Information System

Environmental constraints – Natural resource siting considerations

FEMA – Federal Emergency Management Agency

FNOC – Fleet Numerical Oceanography Center

GIS – Geographic Information System

Integrated coastal management – Multi-jurisdictional resource management and protection

Jurisdictional constraints – Governmental land use and zoning policies

LCP – Local Coastal Program

LUP – Land Use Plan

Mariculture – Controlled production of ocean resources

MBARI – Monterey Bay Aquarium Research Institute

MBNMS – Monterey Bay National Marine Sanctuary

MMRL – Monterey Marine Resource Lab

MOA – Memorandum of Agreement

MOU – Memorandum of Understanding

MPSP – Marine Pollution Studies Program

NCGA – Northern California Golf Association

NEPA – National Environmental Policy Act

NOAA – National Oceanic and Atmospheric Administration

NODC – National Oceanographic Data Center

NOS – National Ocean Service

Operational constraints – Operational requirements for coastal-dependent land uses

OCS – Outer Continental Shelf

OSPR – Oil Spill Prevention and Response

PFEG – Pacific Fisheries Environmental Group

Urban growth boundaries – Separates urbanized land from rural land

# I. INTRODUCTION

## Background

The interface between land and ocean provides a diverse and productive assortment of natural resources, perhaps more than anywhere else within the earth's biosphere. Because of the limited amount of coastal area suited for the study, management, and utilization of marine resources along the central California coast, it is critical that marine research, education, and resource-sustaining activities requiring shoreline locations be accommodated. This thesis work considers whether or not marine-related research, education, and resource-sustaining land uses can be adequately accommodated from both a policy and geophysical perspective within a part of the central California coast adjacent to the Monterey Bay National Marine Sanctuary (MBNMS).

Of specific interest are coastal-dependent and coastal-related land uses associated with marine research, education, resource protection and land-based production of renewable ocean resources, particularly mariculture. *Coastal-dependent* land uses are those that require direct and sustained access to coastal environments and resources in order to function at all. Common examples include commercial fishing, ocean transportation/shipping, water-dependent recreation, and off-shore oil development (on-shore facilities). Ocean resource protection and management, marine education and research, aquaculture and sea farming, and other land-sea interactions are also coastal-dependent land uses. *Coastal-related* land uses directly support coastal-dependent land

uses, typically by providing marine-related facilities, services, and equipment, but are not dependent upon direct access to coastal resources.

A portion of the central California coast was chosen for its proximity to existing and potential locations for marine research, an area believed to be destined to make the Monterey Bay area a world-class center of marine sciences. The chosen study area lies along California's central coast between the Santa Cruz-San Mateo county line to the north and Point Sur to the south. The study area also extends inland approximately 2,000 feet from shore. This 25-square-mile area is under the jurisdiction of the CCC and two counties, having at least 18 existing marine research and education facilities, and constitutes the vast majority of the populated portions of the central California coast (Figure 1).

Land requirements for the expansion of research, education, and mariculture coastal-dependent and coastal-related land uses have been forecast for approximately ten years, capturing only the most likely scenarios for growth and expansion of facilities. The study considers land use policy or *jurisdictional constraints*, as well as *environmental constraints* and *operational constraints*, which includes the need to maintain collaborative efforts among similar coastal-dependent entities. Potentially available land areas for siting these facilities, based upon the existing policy and management framework, as well as environmental and operational considerations, are presented. Because of a mixture of general public, government, and private industry involvement in this subject, issues associated with two coastal-dependent land development proposals are presented in Chapter VI as case studies.

By virtue of its recent designation as a national marine sanctuary, the 75-mile long coastal area centered on Monterey Bay is poised for a greater proliferation of research- and education-based coastal-dependent and coastal-related land uses (U.S. Department of

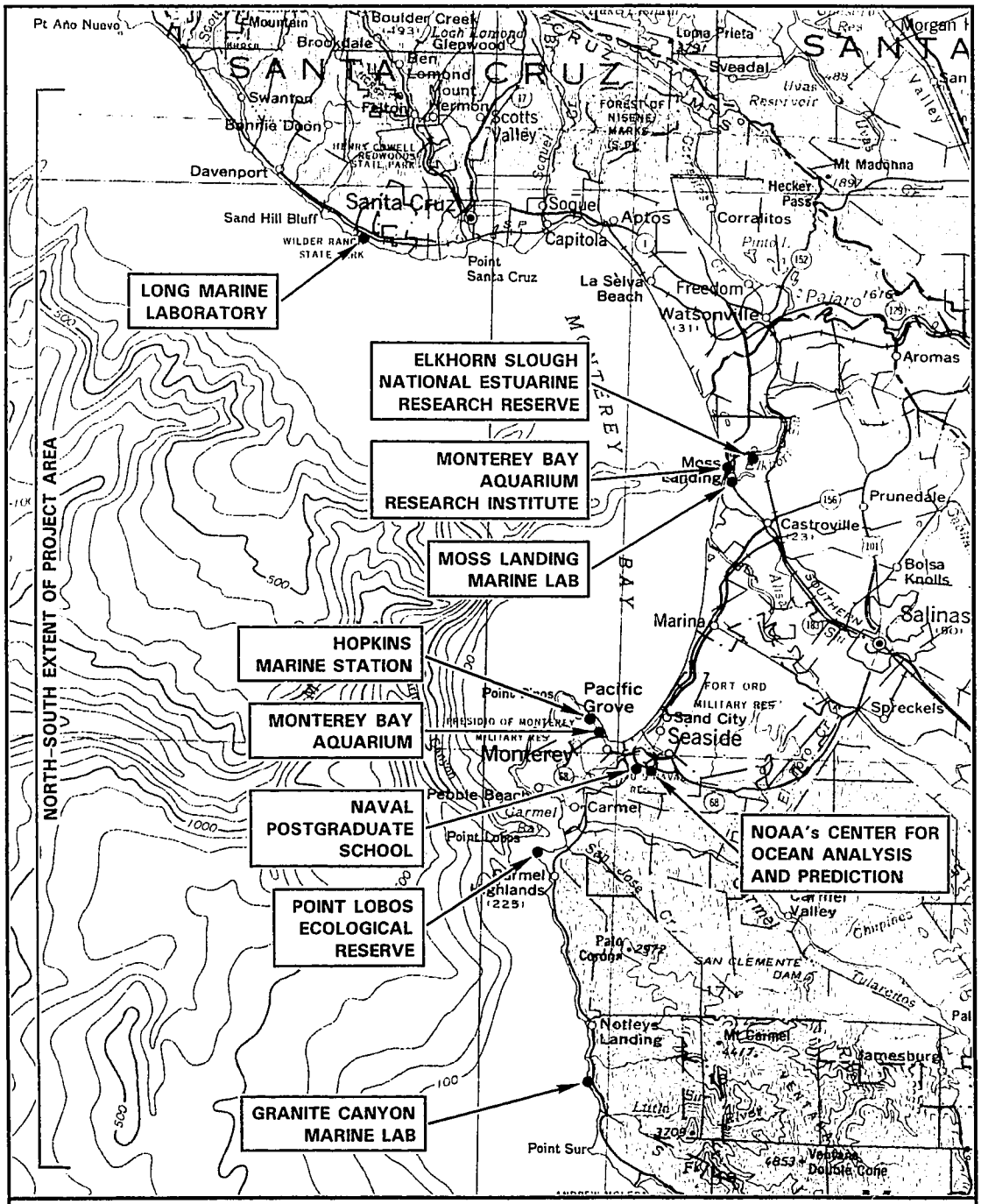



FIGURE 1: MONTEREY BAY AND CENTRAL COAST REGION

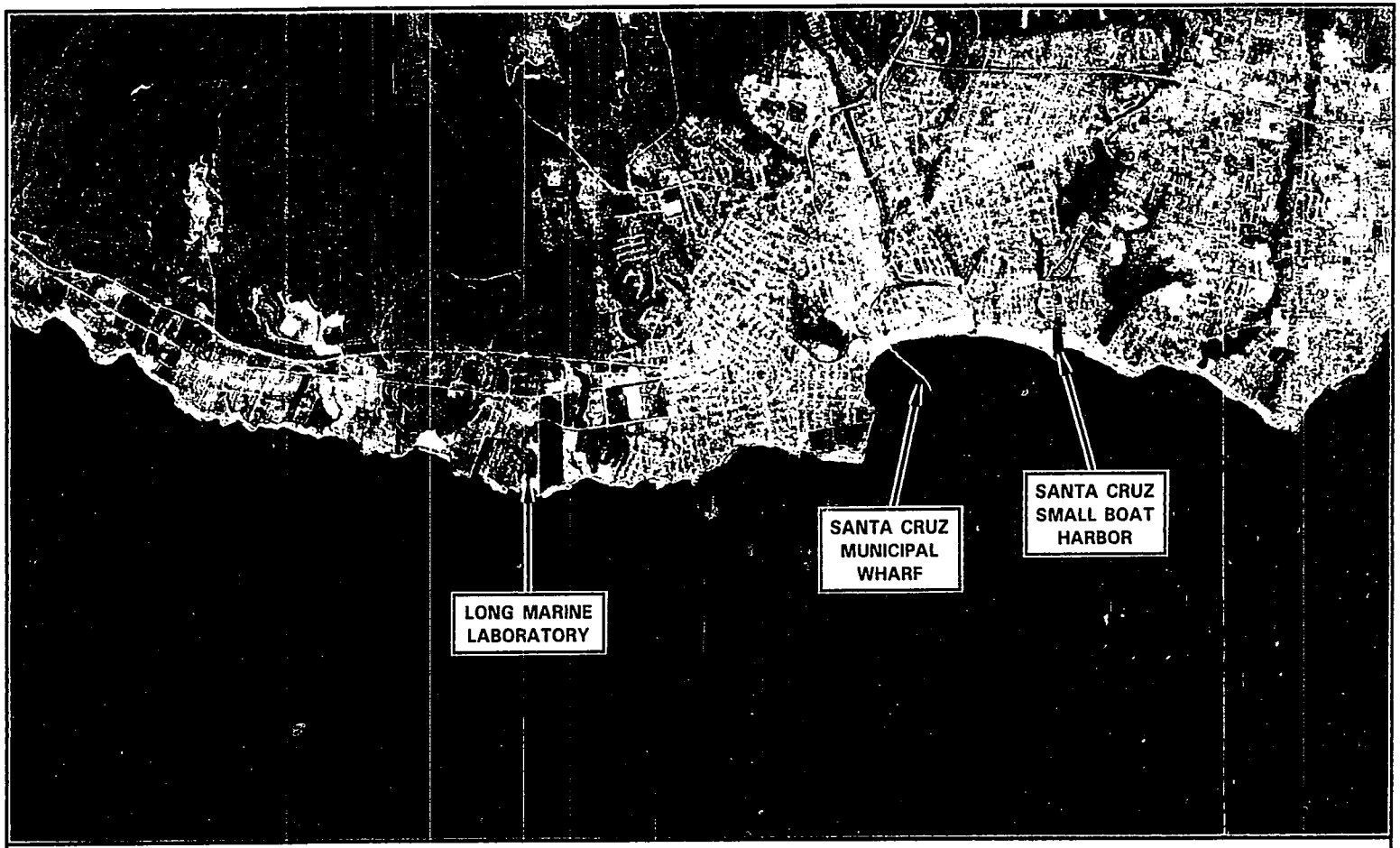
Commerce, NOAA 1991b, 3; Griggs 1995, unpublished). These endeavors are expected to continue to grow in the central coast region, potentially replacing previously existing land uses. For example, property obtained by realignment and downsizing of military installations (e.g., Ft. Ord) is expected to become available for coastal-dependent and coastal-related land uses, among others. With national marine sanctuary status, land uses associated with research, management, and protection of marine resources would replace other formerly typical coastal land uses. Formerly proposed Outer Continental Shelf (OCS) on-shore support and transport facilities currently not permitted in the MBNMS would be displaced by NOAA management and education facilities within coastal areas. Newly created marine research and education opportunities may also displace properties traditionally developed for residential, commercial, and agricultural use.

The CCC oversees the certification of local coastal programs that outline resource protection, land development policies, and their implementation mechanisms (e.g., zoning). One of the CCC's mandates is to assure priority for coastal-related and coastal-dependent land uses over most other development adjacent to the coast. How this national/state development priority policy manifests itself as a local operational practice, and under what type of federal, state, and local management framework, is the critical question when considering whether these endeavors are to contribute to the region's emergence as a center of marine excellence.

If coastal-dependent and coastal-related endeavors are expected to proliferate in the coastal areas adjacent to the MBNMS, the unique operational, environmental, and jurisdictional constraints impinging upon coastal-dependent land uses must be adequately understood. This thesis sets out to determine what policy and management structure is in place to provide for this unique development/environmental niche, what types of coastal-dependent and coastal-related land uses are expected to expand, and potential areas where they can be best accommodated.

Prime examples of burgeoning coastal-dependent land uses in this region include: expansion of the University of California, Santa Cruz (UCSC) Long Marine Laboratory onto the adjacent Terrace Point property in Santa Cruz, the Monterey Bay Aquarium Research Institute (MBARI) expansion at Moss Landing, and the relocation of the destroyed Moss Landing Marine Laboratories (MLML) within the Moss Landing area. Other uses include government and institutional marine resource education, protection, and management programs, such as various National Oceanic and Atmospheric Administration (NOAA) research laboratories supporting the National Marine Fisheries Service or the MBNMS management and education offices.

A study area within 2,000 feet of the shore is chosen since seawater can be accessed for research or mariculture via pumps and pipes without significant economic hardship (Anderson 1995; Scravini 1995). Land areas with direct coastal access are considered first; however, sites approximately 2,000 feet inland from the shore are also viable. There is a wide range of existing land uses within the project area that must be considered (i.e., public, private, developed, agricultural, open space, and protected). While zoning and land use maps prepared by local jurisdictions are typically evaluated first when evaluating land use proposals, a view of urban-rural boundaries from a purely geophysical perspective is useful for depicting potentially viable land areas for coastal-dependent land use. A visual depiction of coastal land uses in the Monterey Bay, including the location of several major coastal landmarks is provided on Figures 2 through 7. Within the established project area, this thesis will focus on endeavors which are restricted to coastal areas and endeavors which enhance our knowledge and sustainable use of marine resources.

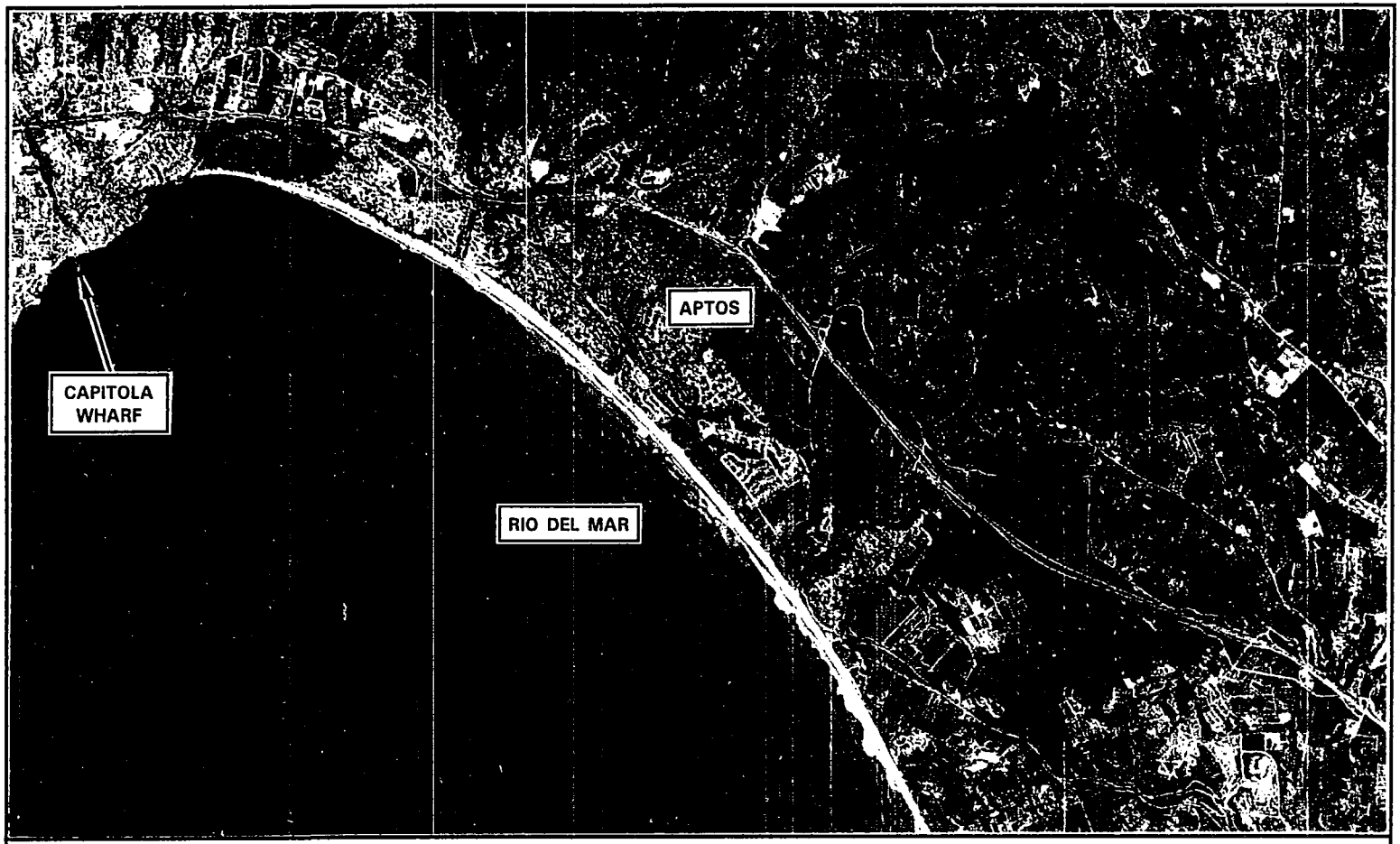



SOURCE: FRIENDS OF MONTEREY BAY, 1993

0 0.5 1.0 MILES

N

FIGURE 2: MONTEREY BAY COASTAL LANDS (WEST SIDE GREATER SANTA CRUZ)



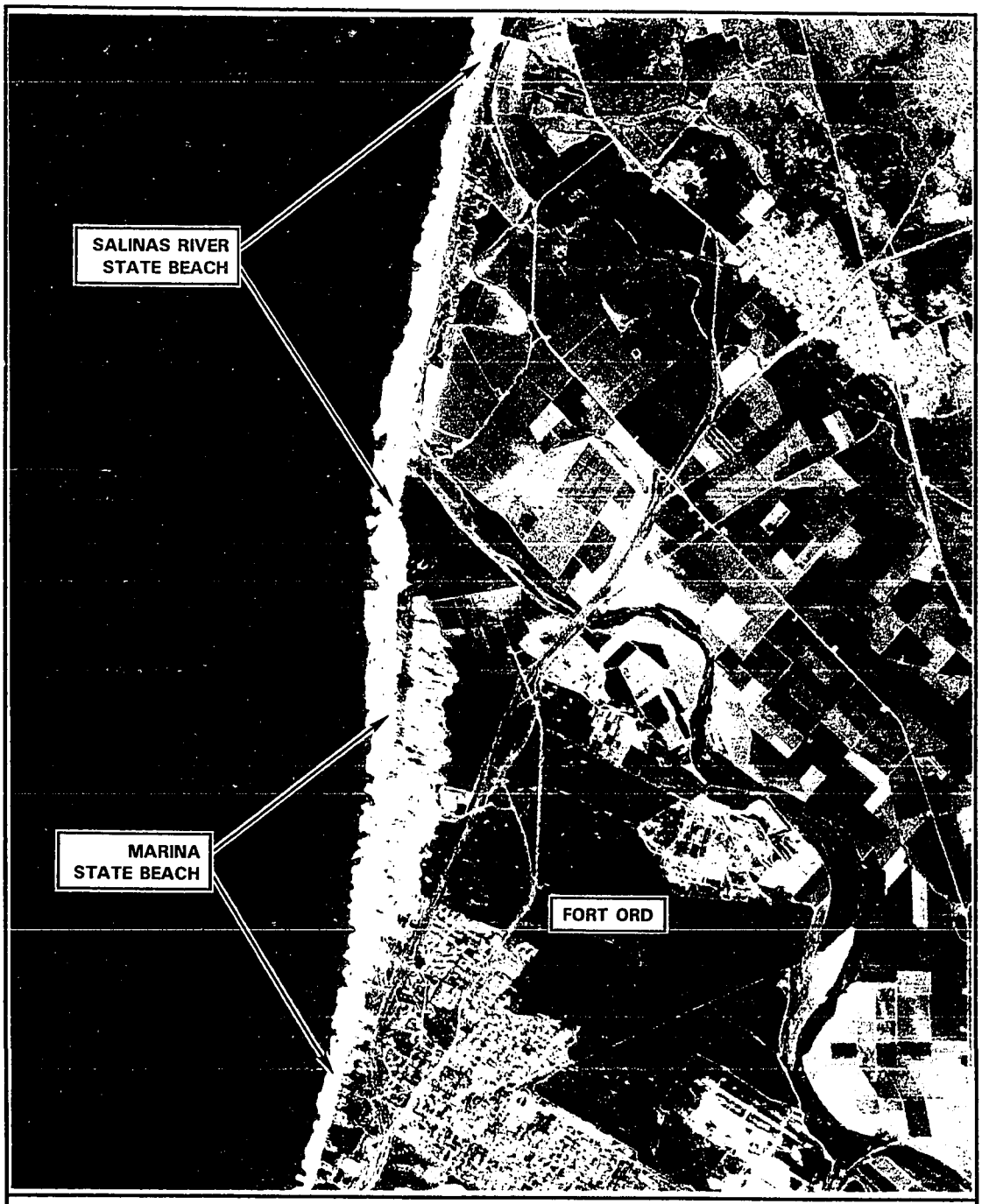

SOURCE: FRIENDS OF MONTEREY BAY, 1993

0 0.5 1.0 MILES

N

FIGURE 3: MONTEREY BAY COASTAL LANDS (EAST SIDE GREATER SANTA CRUZ/APTOS AREA)


FIGURE 4: MONTEREY BAY COASTAL LANDS (SAN ANDREAS/MOSS LANDING AREA)




SOURCE: FRIENDS OF MONTEREY BAY, 1993

0 0.5 1.0 MILES

N

FIGURE 5: MONTEREY BAY COASTAL LANDS
(SALINAS RIVER STATE BEACH/MARINA AREA)


SOURCE: FRIENDS OF MONTEREY BAY, 1993

0 0.5 1.0 MILES

N

FIGURE 6: MONTEREY BAY COASTAL LANDS (SEASIDE AREA)

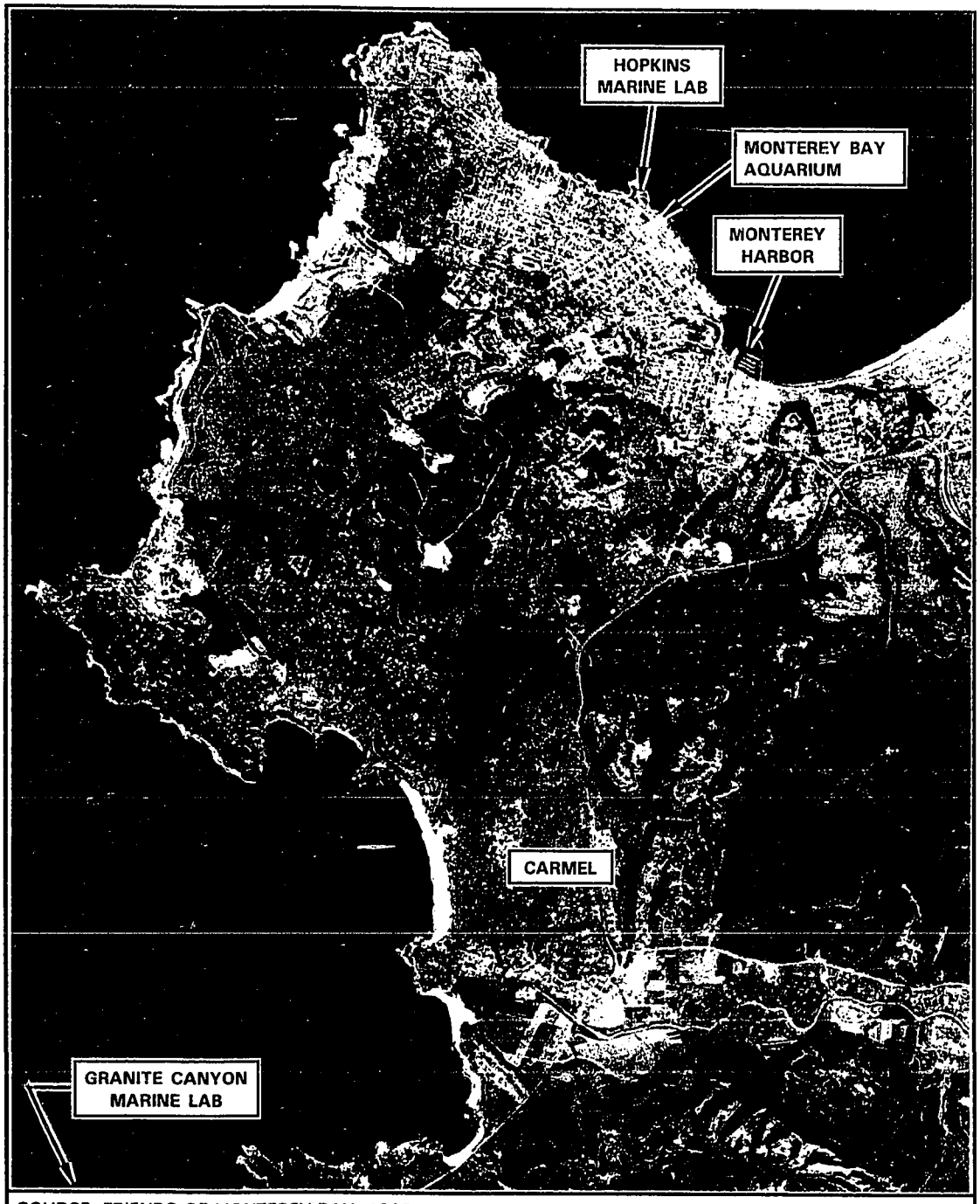



FIGURE 7: MONTEREY BAY COASTAL LANDS (GREATER MONTEREY/CARMEL AREA)

## Problem Statement

This thesis will address whether or not the proliferation of coastal-dependent and coastal-related land uses associated with research, education, and the protection of marine resources can be accommodated along a critical portion of the central California coast. For these unique land uses, suitable coastal properties may not be available after considering operational, environmental, and jurisdictional siting constraints.

The following research questions have been developed for exploration during the course of this thesis:

- What factors tend to facilitate or deter coastal-dependent/coastal-related land uses?
- What types of coastal-dependent and coastal-related land uses are likely to proliferate within the project area?
- Considering jurisdictional (land use), environmental, and operational objectives, which areas are most suitable for the coastal-dependent/coastal-related land uses under consideration?
- Can the future needs of coastal-dependent/coastal-related land uses be accommodated along a portion of the central California coast?
- Do public-private partnerships and collaborative efforts play a role in the development of coastal-dependent and coastal-related land uses?

## Prior Studies

Numerous studies have been prepared for ocean and coastal resource research and management practices. For coastal-dependent land uses, the vast majority of the literature considers specific endeavors in which ocean resource monitoring efforts and impact studies are necessary, such as for off-shore drilling or water-oriented recreational activities (Chabot

and Associates 1989, 7-1; Dornbusch 1994, 11). The treatment of regional policy roles and their application are, likewise, geared towards marine resource allocation decisions and values (Hildreth 1994, 121). Except in relation to under-developed countries, specific assessments which extrapolate the need for coastal-dependent or coastal-related land uses, and a region's ability to accommodate those uses, have not been found.

For developing countries, the need for "building institutional capacity" in order to assist with the development and implementation of integrated coastal management has been investigated (Crawford, Cobb and Friedman 1993, 311). This work considered strategies for building coastal education and management facilities at universities and training centers and the growing demand for associated coastal practitioners. Current staffing levels at major national programs worldwide were examined to estimate existing capacity and anticipated demand for these practitioners; however, this approach did not address issues related to existing build-out of coastal areas, the policies associated with competing uses, and the typical operating requirements of coastal-dependent facilities. If a lack of "California-knowledgeable" coastal resource managers exists (Cicin-Sain 1990, 330), all these factors must be considered in order to meet the capacity expectations of the central California coast.

One notable assessment of the funding and interaction of U.S. coastal scientists and engineers associated with government, education, and industry has been done using mostly national statistical parameters obtained between 1986 and 1991 (Turner and Schubel 1994, 155). Centers of concentration for coastal scientists and engineers were identified using density-per-population and density-per-length of coastline. Based on this measure, it should be noted, California was not well represented, lying somewhere in the middle of all coastal states considered. The study does provide information which is useful for understanding the funding and cross-sectoral interactions of coastal research institutes nationally. Chief among these is the following: Of the three performers of marine research

(government, industry, and education), education excels at developing new information; government focuses best on monitoring projects and overall program management; and industry is adept at garnering funds for profit and proprietary interests and has established a reputation for responsiveness. A strong preference for government and non-profit institutions to collaborate with coauthors at educational institutions was also shown. Partnerships among educational-federal-industry linkages were encouraged for good analysis, as is needed for sound policy decisions by managers and politicians.

The trend toward addressing coastal issues through educational collaborations and partnerships has been put forward by several authors. Reliance on partnerships and cooperative efforts occurs when major societal issues cannot be resolved by a single organization. Coastal and marine issues are expected to be addressed via partnerships principally because individual efforts will not be sufficient to have the desired result (Bender 1994, 11). Indeed, the Clinton Administration has based its national approach towards the environment on the principals of ecosystem management and partnerships. Coastal ecosystem conservation is so complex, with diffuse responsibilities and social needs, that "partnerships among federal, state, and local stakeholders may be the only way in which proper ecosystem management can be achieved" (Brown 1994, 33). It is believed that an interdependency exists between (1) coastal ecosystem research and management, (2) forging of partnerships among coastal stakeholders, and (3) the proliferation of related coastal-dependent and coastal-related land uses. This is particularly true within the coastal lands adjacent to an ecosystem as diverse as the MBNMS (Griggs 1994, unpublished).

The creation of the NOAA, within the U.S. Department of Commerce, in 1970 has created a system in which a large, central organization can oversee national marine sanctuaries, coastal zones, fishery resources, marine mammals, endangered species, hazardous materials, oil spills, and the environment. Since the late 1980s, NOAA has redesigned its science, management, education, and outreach activities into interdisciplinary

programs which respond to many contemporary issues (Bigford 1994, 22). One significant new endeavor is the Coastal Ocean Program, which combines skills within the entire NOAA hierarchy to provide new services and products. Under NOAA's Strategic Plan, integrated and coordinated management operations will support work on coastal zone management, marine sanctuaries, estuarine research reserves, and other coastal issues. Research and monitoring studies under the Plan suggest that an emergence of coastal-dependent activities continues within the study area (U.S. Department of Commerce NOAA 1993, 1).

Although not specifically directed towards coastal-dependent and coastal-related land use, D.R. Godschalk's work has expressed how "legally mandated objectives of the Coastal Zone Management Act have been implemented over time," and how "the network of public and private organizations, or coastal policy stakeholders, influence coastal policy." Godschalk's so-called "coproduction" concept for producing plans, programs, and actions appears to be congruent with successful partnerships aimed at large-scale problem solving, such as evaluating and managing sites which are both appropriate and unique to critical coastal-dependent land uses. When attempting to provide a useful model for coastal policy implementation relative to coastal-dependent land uses, Godschalk appears to capture all the elements one must consider in his use and description of coproduction.

The framework for sound policy formulation must link the spectrum of coastal stakeholders and their core values to coastal program implementation, while considering changing political and economic conditions that shape policy and its implementation. Coastal policy is now shared by a community of coastal stakeholders, but in a disjointed fashion where the instrument for implementation is not often agreed upon. Efforts towards integrating coastal management across a broader scale of government and private stakeholders require a sharing of interests and values. Coordinating this process must

include nested policies linking each stakeholder along the entire local-international spectrum. The Coastal Zone Management Act (CZMA) provides a framework between national and state interests, and similarly, local coastal programs provide a policy link between state and local governments. However, these linkages may become disjointed either by changing local priorities, disparate local objectives, or by diverging interpretations of state (Coastal Act) policy. Incentives must then be created to link local interest towards a broader set of priorities. Public outreach to fully inform citizens' groups, provisions for education opportunities, infusion of direct and indirect economic growth, and provision of a higher quality of life are all incentives for a more broad-based level of participation. These efforts must go beyond single, popular natural resource issues and encompass all environmental quality concerns, planning objectives, and growth issues.

## Scope of the Project

This thesis project considers specific existing and proposed coastal-dependent and coastal-related land development which is expected to occur within the next 10 years. The land uses considered are those specifically tied to marine research and education, and resource protection and/or sustainable uses, as practiced by government, private institutions, universities, and land-based mariculture operations. Coastal-dependent or coastal-related recreation, transportation and shipping, commercial marine operations, harbors and ports, and off-shore drilling and mining are excluded from this study. The definitions of coastal-dependent and coastal-related contained in the Coastal Act apply to the land uses chosen for this study. (See Chapter III.) Coastal properties approximately 2,000 feet landward of the mean high tide line, including estuaries, will be considered for potential use by these coastal-dependent activities. Coastal-related land uses able to function beyond this boundary are expected to be less problematic in terms of meeting

siting constraints and policy standards. As previously mentioned, all land uses under consideration lie within the coastal area centered on Monterey Bay and lie adjacent to the MBNMS. This region includes Monterey and Santa Cruz counties, each of which have either developed or proposed Local Coastal Programs (LCPs).

While more sophisticated mapping tools, such as a Geographic Information System (GIS), are recommended for future studies, budgetary, material, and time constraints limit the geographic analysis for this study to the manipulation of publicly available maps and other printed materials. The Environmental Mapping Information System (EMIS) employed by Santa Cruz County has been utilized to portray coastal attributes within that jurisdiction. Aerial photographs (1993) supplied by the CCC, amended 7.5-minute topographic quadrangle maps, and federal, state, and local publications illustrating various attributes have been obtained for a greater geographic representation of conditions relevant to this thesis.

Personal interviews were also performed. These were done in a systematic and uniform manner in order to obtain data on existing and proposed coastal-dependent and coastal-related land uses. Of interest is their physical requirement for close proximity to the coast. The use of office and laboratory space was sought and is typically expressed in square footage or usable acreage. General development options and preferred siting parameters (i.e., collocation with similar facilities, access to harbors or deep water ports, proximity to existing support facilities, among others) were of interest. Prime examples of similar coastal-dependent and coastal-related development which are currently in the process of expanding or relocating are presented herein as case studies.

Data Collection

The majority of the data and information collected were obtained in three ways: (1) analyzing draft, unpublished, or published plans, proposals, investigations, and survey documents, articles, and maps; (2) interviewing local, regional, state, and federal agencies and jurisdictions; and (3) polling various agencies, institutions, and private industry representatives with existing or proposed programs in coastal-dependent and coastal-related endeavors. Recent investigations which discuss marine research and resource protection policy, particularly state and federal efforts, were obtained for a myriad of coastal land activities and programs. Literature searches were performed using electronic databases and catalog filing systems, such as the SOCRATES system at Stanford University, the MELVYL system at the University of California, Santa Cruz, and the on-line services at San Jose State University. While few sources specifically referred to "coastal-dependent" or "coastal-related" activities, articles concerning marine research, integrated coastal management, and collaboration between coastal research, industry, and government were obtained. Primary periodicals included the *Journal of Coastal Researc*h and *Coastal Management.* Reports and special studies obtained from the central coast office of the CCC were another valued resource. Lastly, conference proceedings, newspaper articles, government reports, and unpublished papers provided timely and salient background material.

In a number of sources, managers, politicians, and researchers predicted the emergence of a burgeoning center for marine science and education in the Monterey Bay region. Few sources, however, underscored the area's jurisdictional propensity or physical ability to absorb these potential uses at suitable locations. Neither the ramifications of differing policy interpretations, nor the need to employ a "greater-than-local" perspective relative to coastal-dependent land use, has been expressly stated for this region.

Valuable insight into the aforementioned issues was obtained during the interview, or polling, process. Discussions with local jurisdictions were performed in a manner which would obtain a balanced understanding of (1) how coastal-dependent and coastal-related land uses are defined, (2) if and how these land uses are afforded land use priority, either in practice or in policy, and (3) what examples of coastal resource-dependent siting activities have been influential in preparing planning documents and implementing activities. Whether expressed electronically or in hardcopy, county and municipal agencies have been a valuable resource for mapping information which might impinge upon the siting of coastal-dependent facilities.

Information concerning the status of existing and planned expansion of coastal-dependent and coastal-related land uses in the study area was obtained via an informal polling of managers and associates for institutes, industries, government, and educational programs. Although informal when compared to statistical polling techniques, certain standards were maintained throughout this process, whether the interview was by telephone or in person. These standards, obtained from *Citizen Public Opinion Polling,* required that (1) questions be kept clear, concise, and simple, (2) questions be grouped by related topic, (3) a mix of "open-ended" and "closed-ended" questions be asked, and (4) that respondees be chosen who are considered knowledgeable about the subject matter (Asher 1988, 32).

The following chapters present a review of coastal management programs; various definitions of coastal-dependent land use; a review of central coast LCPs; a geographical analysis of jurisdictional, environmental, and operational constraints; and two case studies. These programs, policies, and conditions all affect the central California coast's ability to accommodate the pragmatic coastal-dependent and coastal-related land uses considered in this study.

## Thesis Research Concept

Rather than focusing on a single environmental condition or resource or the policies and methods for a resource's protection or enhancement, this thesis strives to further understand the dynamics between three interrelated concepts affecting coastal resources. These concepts are (1) marine resource protection, (2) growth and development patterns, and (3) collaborative marine research, education, and resource-sustaining utilization. The resource protection concept is tied to the area's marine sanctuary status and the research and management endeavors designed to understand this regional ecosystem. Natural resource protection is also associated with the review of environmental constraints that must be considered when siting coastal-dependent and coastal-related land uses. Growth and development patterns relate to natural or man-made conditions which either accommodate or inhibit coastal-dependent land use. Of relevance to this thesis are the examples of "co-production" that foster endeavors between research, education, government, and industry, in order to attain a greater understanding of our marine environment and sound ocean protection and utilization practices.

The interaction between these three concepts has been tested by determining existing and planned coastal-dependent endeavors and the application of policies contained in local coastal programs. For a geographic perspective, a broad evaluation of resource distribution, jurisdictional districts, and operational attributes has been undertaken to identify preferred areas likely to be suitable for certain categories of coastal-dependent and coastal-related land uses. A goal of this thesis is to give an indication of the importance of accommodating a center of marine excellence located in the central California coast, both from a local perspective and from a broader Pacific Rim perspective. Publication of this assessment should alert planners and developers of the proliferation and competitiveness of

coastal-dependent land uses and indicate how these land uses may be beneficial both locally and nationally.

# II. COASTAL PROGRAMS AND MANAGEMENT

## Introduction

This chapter provides an overview of programs which have set the framework for the regulation and management of coastal-dependent land uses, particularly those which affect California and its central coast. A clear and concise understanding of this structure and its ability to prioritize and accommodate coastal research, education, and mariculture is sought. The regulatory and management framework discussed here considers the very underpinnings of these programs and their relationship to key stakeholders directly interested in coastal land uses; it also considers their potential to provide a coordinated, balanced, and integrated management of activities. Federal, state, and local coastal programs are evaluated for their treatment of these particular coastal dependent land uses and their ability to integrate goals which have a greater-than-local importance.

Several major federal, state, and local coastal programs and resource management practices exist within the central California coast. These policies and programs are influential in resource protection and monitoring, public education, the managment of coastal development and growth, and the direction of marine-related activity within the coastal zone. The programs and policies which follow affect coastal-dependent and coastal-related development by fostering growth via the creation of marine research and education, regulating coastal zone development, or ensuring coastal resource protection and sustainable resource utilization.

NOAA Programs

At the federal level, NOAA plays a major role in coastal resource management in the central California coast. Under the CZMA of 1972, NOAA has established standards for the acceptance of state coastal management programs. The CCC, via the NOAA-approved California Coastal Act of 1976, prepares and enforces coastal zone conservation and development policies protecting coastal resources and enabling their wise and appropriate use.

The second major NOAA program which greatly influences the central coast is the Sanctuaries and Reserves Division. It designated the Monterey Bay National Marine Sanctuary in 1992, affording it enhanced resource protection. The Sanctuary designation mandates that certain activities associated with coastal-dependent and coastal-related management and research be initiated. It is NOAA's goal to effectively manage marine resources within the Sanctuary via new and existing research programs. Under a Memorandum of Agreement (MOA) and other logistical and financial support, NOAA will coordinate the research efforts of numerous federal, state, and regional agencies and committees. The MOA facilitates the integration of the internal mandates and expertise in coastal and ocean resource management from NOAA and other federal programs, the California Department of Fish and Game, and various research and education institutions (U.S. Department of Commerce, NOAA 1992a, I-88).

Coastal Research and Education

Non-governmental research and education institutions play a key role in setting coastal management practices and disseminating scientific knowledge within the marine sciences community (Griggs 1994, unpublished). In 1991, at least eight marine research, oceanographic and atmospheric institutions existed in the Monterey Bay region, representing an annual investment of approximately $52.5 million. At that time, each

institution had planned investments rivaling Woods Hole, Massachusetts, as an oceanographic research community (U.S. Department of Commerce, NOAA 1991b, 3). By 1994, the number of marine-related research institutions in the Monterey Bay area had increased to 13, with many of these facilities planning to expand. Most of these additional programs are either directly or indirectly related to the 1992 Sanctuary designation, and conduct research and education programs that will benefit marine ecosystems throughout the central coast and the Pacific Rim. Non-governmental marine research and education programs, which are also members of the MBNMS Research Activity Panel, account for a significant portion of these endeavors. The MBNMS Research Activity Panel is a forum for the discussion of research programs, management issues, and information dissemination.

Aquaculture and Mariculture

Aquaculture activities that require the use of ocean or estuary seawater, or a freshwater-seawater mix, are commonly referred to as mariculture. Mariculture typically requires a steady and direct influx of seawater for the incubation and growth of shellfish, bivalve mollusks, sea hares (sea slugs), and anadromous fish, such as salmon and trout. These activities also use seawater for preparing cultures and holding harvested resources. Large- and small-scale kelp harvesting also takes place seasonally, mostly near Pt. Sur located at the study area's southern extent (U.S. Department of Commerce, NOAA 1992a, II-67).

Mariculture offers great promise for California and the central coast. Nutrients produced by the seasonal upwelling phenomenon near the coast provides a diversity of marine flora and fauna, and the opportunity to produce marine-based food harvests and other products. Products derived from mariculture range from commercial seafood products, sea slugs used for neurophysiological research, and algae production for research programs. Assets, property, investment capital, and human resources have been promised

by many research institutions for the establishment of this industry (Bowden 1982, 83; Phoebus 1995).

Feeding the world's population depends upon our ability to use the sun as energy to convert nitrogen into plant protein. The same photosynthetic process that converts nitrogen to protein is also responsible for producing most of our fuel and food supply. Domestic waters are an underutilized source for increasing domestic food supplies; hence, the option to farm the sea must be evaluated in terms of technological engineering, ecological balances, public policy, and private property rights. Particularly in the U.S., the mariculture industry is still within the pioneering stage in many of these respects, and will require continued research, education, collaboration, and marketing in order to provide California with a viable resource-sustaining industry. The industry is dependent on good water quality, small-scale labor, and the availability of coastal properties. Land use restrictions on the coast have traditionally impeded the entry of new commercial operations. The uncertainty of these coastal regulations has limited some of the entrepreneurial activity associated with the early stages of industry development. As needs become more widely known, these impediments may become less stringent and more accommodating of new operations. Recent experience by one mariculture operator suggests that, while the facility siting process has worked in his case, it remains an arduous task requiring much sacrifice and capital investment (Scravini 1995).

Unlike Asia, where mariculture has been practiced for centuries, many suitable sites in central California have been affected by development and associated degradation of water quality, including salinity and temperature alterations. Over the last ten years, Elkhorn Slough in northern Monterey County has been an attractive area for mariculture; however, the industry there has become somewhat transient due to either environmental degradation, financial instability, or loss of suitable land space. Since the 1970s, environmental laws governing all types of coastal development were equally applied to mariculture.

Compromises made to politically well represented groups, such as housing, trade organizations, and utility companies, did not extend to mariculture. It has been recognized that "in order for coastal mariculture to prosper, the regulations governing it must be refined to achieve harmony between public objectives and industrial requirements" (Bowden 1982, 87). While advances in public agency recognition and management of mariculture have improved since the 1980s, success within the currently existing process is difficult to achieve.

As the industry develops and becomes more visibly apparent on the coast, greater public dialogue on issues such as facility design and siting can be expected. The industry's fate will depend on how regulatory agencies, particularly at the local level, and the general public respond to proposals for coastal aquaculture facilities. Local coastal programs and implementation plans which address priorities for coastal utilization and resource sustainability have the potential to consider the needs of mariculture as a coastal-dependent entity. Technical reports suggesting this aspect of California's developing mariculture industry were put forward over 13 years ago (Conte and Manus 1982, 117). Santa Cruz County's approach, based upon their approved LCP, is to categorize aquaculture as a "Specialized Agricultural Use," where new or expanded aquaculture operations must obtain a coastal development permit and undertake the environmental review process, in addition to undergoing a review by the California Department of Fish and Game as a condition for permit approval. Facilities that are sited on the coast must (1) be coastal dependent per the Coastal Act definition, (2) limit any adverse impacts upon sensitive habitats, (3) provide lateral beach access, (4) provide for public safety when adjacent to recreation areas or other private property, (5) bury intake/outfall lines, and (6) post a bond to recover damaged public shorelines and beaches (County of Santa Cruz 1994, 5-55).

Coordination of Coastal Programs

Effective management of the MBNMS requires that the Research Activity Panel inaugurate coordinated programs and address management concerns stated in their Scientific Research Plan (U.S. Department of Commerce, NOAA 1993, 3). The large number of research institutes and university programs in the vicinity provide an ideal situation for regional collaboration and the forging of new public-private partnerships, thereby creating a heightened growth potential for these specialized coastal-dependent land uses. Accommodation of these priority land uses by utilizing appropriate coastal sites is needed; however, a policy and management framework must also be envisaged which will fulfill this need for the benefit of all the various coastal stakeholders and for the good of greater-than-local interests.

Such a framework, while seeking national interests, must include regional and local governments and interested stakeholders. For this to occur, a clear incentive for broad-based participation must be provided. Common purpose and clear objectives need to be articulated. Education and public outreach are needed to make stakeholders aware of common interests and issues, and the need for a multi-lateral approach from a national and local perspective. Linkages from local to regional, regional to state, and state to national objectives must exist. This will establish the framework for sound policy decisions based on a common understanding of the issues and their consequences, and a full accounting of external costs, particularly at the local level. While these linking policies are not established within the course of this study, an understanding of who the key stakeholders are, relative to coastal issues, is presented. Identification of key stakeholders is important to understand current policy and its role in accommodating coastal-dependent land uses.

## Key Stakeholders in Coastal Zone Management

Key stakeholders in coastal zone management range from industry and government to major interest groups and public and private organizations. Coastal policies at the federal and state levels have been created by and for these stakeholders. Coastal stakeholders are a blend of governmental and nongovernmental, profit and nonprofit, development and environmental organizations or groups. They each influence the system of policies, charters, plans, and programs affecting resource management in coastal areas (Beatley, Brower, and Schwab 1994, 60; Godschalk 1992, 96). Over the past 20 years, the federal government has attempted to issue new or comprehensive management programs (e.g., the CZMA), or sought to establish even broader alliances internationally towards an integrated coastal management scheme. Conservative and powerful constituencies, such as commercial fishing and energy exploration, typically resist the incorporation of their activities into these schemes (Knecht and Archer 1993, 196). Government regulation other than the CZMA has commonly been legislated on a use-by-use basis. This fragmentation makes effective integration of coastal management difficult. Strong patterns of communication and the expansion of agency missions tend to follow strong "vertical" lines, typically from specialized (single purpose) federal government departments downward to state agency counterparts, and eventually to the local/regional governmental level. However, competing local goals tend to be infused into the planning and implementation process, despite the expression of a larger goal or vision. An interactive relationship at all levels of government requires a "transparent" decision-making process and open regulatory proceedings. Informed citizen groups with the ability to bring legal action can help ensure insure that positive intergovernmental coordination does take place.

Coastal States

When considering the federal CZMA as a whole, the coastal states must be recognized as the first key group of stakeholders. Under CZMA, their ability to influence economic and environmental change is tied to their participation via a NOAA-approved coastal management program. Influence is also gained by representation in the Coastal States Organization, a delegation of gubernatorial appointees concerned for their state's interest in national coastal policy. Coastal states have some flexibility in their coastal policies, typically via the creation of individual initiatives and programs by coastal program managers. Voluntary state participation under the CZMA and the inducement of financial aid for federally approved programs is the foundation for the successes of the Coastal Zone Management Program. A requirement for CZMA participation is an approved state program to that will act as a guide for federally aided programs or other direct federal actions.

Industry

Commercial industries which utilize coastal environments are equally important when considering key stakeholders located within the central California coast. The most important commercial activities directly dependent on Monterey Bay area coastal resources are commercial ocean fishing and marine-related recreation. However, for the purposes of this study, only land-based mariculture operations which require access to seawater or near-shore resources are included. These operations may collect organisms directly from the Bay, while others grow and produce their own stocks through captive breeding. Public harbors and wharves are considered in this thesis when they play a role in accommodating coastal-dependent activities tied to research, education, and mariculture.

Environmental Organizations

Another group of stakeholders are environmental and conservationist organizations. These range from grassroots organizations, to nonprofit and public interest groups, to state agencies and committees. These groups actively promote diverse initiatives and can be very visible and vocal when expressing their agenda or concerns. For example, local residents and Native American groups opposed to relocating the Moss Landing Marine Laboratories to a property overlooking Moss Landing Harbor. In this case, a neighborhood group sued to stop the project because of the potential for impacting state rare plant species and buried Costanoan/Ohlone Indian cultural resources. Approval of the preferred site was also delayed due to inconsistent positions taken by the Federal Emergency Management Agency (FEMA), which is funding the rebuilding of the MLML facility (destroyed in the 1989 Loma Prieta earthquake). Due to the influence of these stakeholders, project managers have had to perform several unanticipated environmental studies and a re-examination of siting alternatives, at significant public cost. In addition, the education opportunities of MLML students were impacted (Oliver 1995). (See Chapter VI.) Other organized public-interest groups, both at the state and national level, have halted development of off-shore oil drilling leases in the central California coast, and have demanded further evaluation of controversial ocean temperature change experiments that require underwater sound propagation potentially harmful to marine life.

Developers and Utilities

Coastal developers are another influential group and consist of both public and private entities. Private entities include petroleum exploration and drilling companies, commercial fishing industry groups, and home builder associations. Public entities include government, the local chambers of commerce, and the U.S. Army Corps of Engineers. These groups focus on expanding coastal development opportunities, commerce, trade, and

resource extraction rights. They are typically focused on increasing economic activity and may or may not consider the hidden costs of their endeavors. Most often, however, they respond to changes in economic climate, such as interest rates, energy prices, land and housing construction costs, and a host of other factors (i.e., government intervention).

Government

Stakeholders are also present throughout the federal government, particularly agencies related to congressional committees for the merchant marines and ocean fisheries. NOAA's staff within the Office of Ocean and Coastal Resource Management is influential in the implementation of the CZMA and in addressing the interests of a variety of environmental and governmental coalitions (Godschalk 1992, 98). NOAA, in addition to its role in the implementation of the CZMA, operates numerous marine research and science programs and National Marine Fisheries Service laboratories. FEMA can also effect change in coastal policy by the approval or denial of funding to reimburse coastal residents and businesses in the event of a natural disaster, such as flooding, severe storms, or earthquakes and tsunamis.

The Effect of Stakeholder Involvement

Tourism, recreational activities, business, commercial, and industrial uses within the project area are increasing. Oil and gas exploration has been effectively halted by government action, but may be considered in the future. Stakeholder involvement also includes watershed land uses affecting ocean water quality, specifically point and non-point discharges into Monterey Bay. Point sources from municipal and industrial wastes are responsible for various outfalls and discharges, while urban and agricultural runoff from, for example, major agribusiness in Salinas and Pajaro Valleys, contribute as non-point

sources (U.S. Department of Commerce, NOAA 1992a, II-80; California Regional Water Quality Control Board 1989, IV-32).

## Federal Coastal Zone Management

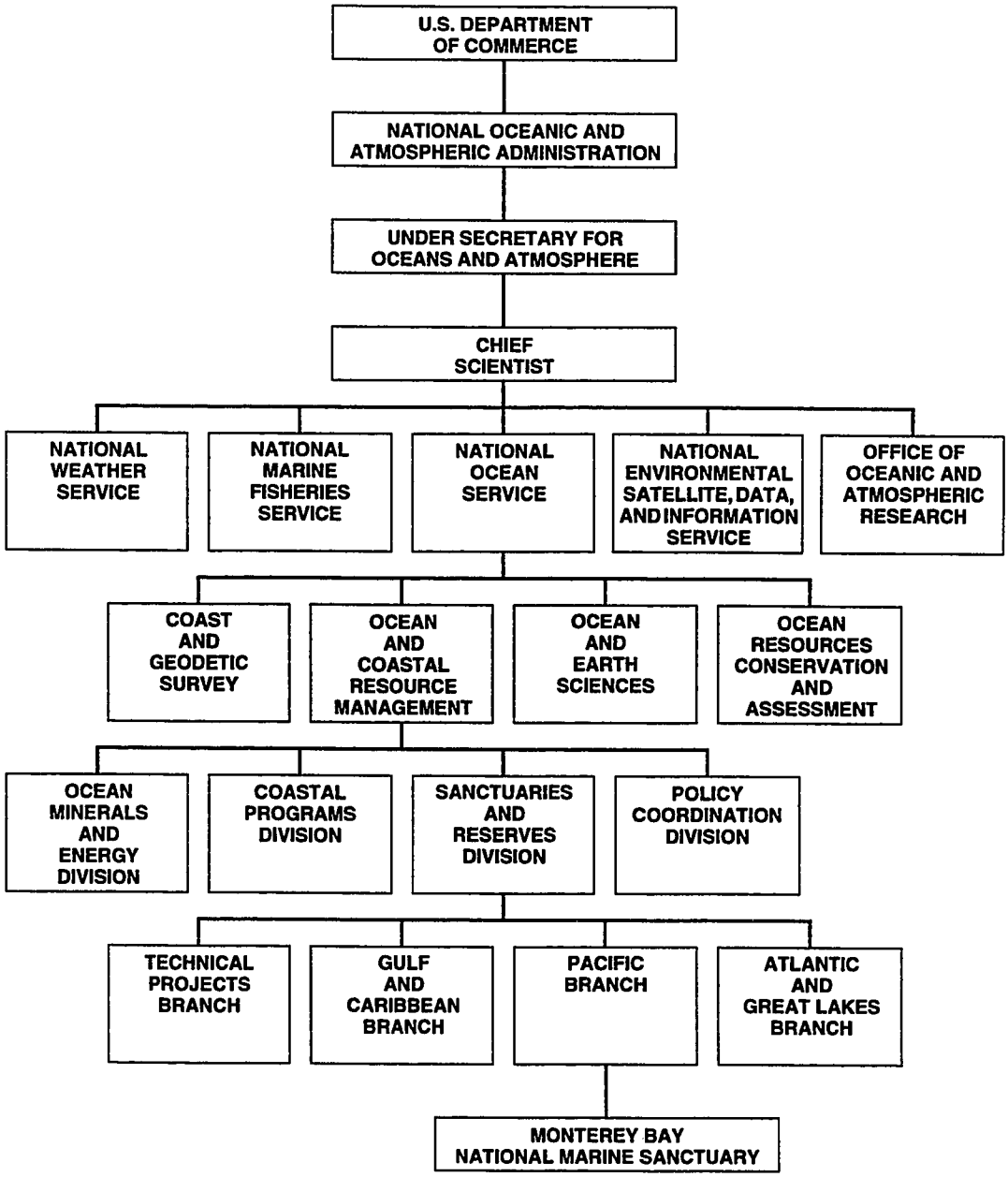
The federal government has many avenues with which to control land use activities in coastal areas. Traditional methods typically involve real property ownership by a large number of agencies and departments. Often, military land holdings and OCS lease areas represent the most sizable of all federal ownerships near coastal environments. Other agencies and departments with coastal land holdings include the National Park Service, the U.S. Department of the Interior (Fish and Wildlife Service), the U.S. Department of Agriculture (National Forest Service), the Bureau of Land Management, and the U.S. Department of Transportation (Coast Guard). To accommodate agency goals relating to land management, resource protection, and marine research, coastal sites for government facilities are typically preferred by organizations such as NOAA (National Marine Fisheries Service), the U.S. Geological Survey (Marine Geology Branch), and the Department of Defense (Department of the Navy). This is particularly true for research laboratories and management programs requiring direct access to high-quality seawater. Overall, the largest single federal land holding within the study area is Ft. Ord, which is currently undergoing conversion to non-military uses including some marine education uses (Hendrickson 1995).

### Creation of NOAA

The largest civilian government agency dedicated to the use and protection of ocean resources is NOAA, which is an amalgam of several agencies having long administrative histories. NOAA was created in 1970 in response to an increasing federal interest in

science and technology, as well as the influence of private groups advocating that more attention be given to the marine environment. Following World War II, space exploration, atomic energy, and other vital basic sciences had developed programs in science and technology, ultimately leading to the 1959 formation of the Federal Council for Science and Technology. Expanded national programs in marine research, education, and construction, however, were not sought until the 1960s. In January 1969, the Marine Sciences Commission recommended in its report, *Our Nation and the Sea*, that a programmatic plan to improve U.S. marine capabilities be enhanced, in part, by the creation of a NOAA. NOAA was not created as an independent agency, as the Commission had suggested, but instead placed under the U.S. Department of Commerce in 1970. By the late 1980s, NOAA accounted for more than half of the total outlays of the Department of Commerce, with a budget for oceans and atmosphere nearing $1.4 billion, and a staff of over 10,000. A schematic of NOAA's organizational structure starting with the Under Secretary for Oceans and Atmosphere to the various divisions within the Office of Ocean and Coastal Resource Management, which includes Sanctuaries and Reserves, Coastal Programs, Policy Coordination, and Mineral and Energy, and the Division Chief for all Sanctuaries and Reserves, is provided (Figure 8).

NOAA is at the center of non-military oceanographic research and the protection of ocean resources. For the 1990s, NOAA's Strategic Plan has laid the course for new approaches to natural resource management (U.S. Department of Commerce, NOAA 1991a, 5). On watershed issues, the agency is collaborating with state and regional entities and existing programs to monitor and manage conditions is the coastal areas. Coastal ecosystem health management has embraced an integrated approach, which may involve anything from site-specific issues and research to ecosystem-wide initiatives for monitoring and protection. In 1993, NOAA's Office of Sustainable Development and Intergovernmental Affairs was created to advise the administration on policies, to




SOURCE: U.S. DEPARTMENT OF COMMERCE, NOAA ADMINISTRATIVE HANDBOOK, 1991

FIGURE 8: NOAA ADMINISTRATION STRUCTURE

encourage economic growth, create jobs, and protect the environment. Public-private partnerships for example, are being created under the Pacific Northwest's Forest Ecosystem Management Assessment Team. Likewise, new research and monitoring programs, both interagency and internationally, under the Marine Biodiversity Action Plan. This broader approach to ecosystem and watershed management and associated interaction with interagency relationships represents a notable challenge for NOAA and its programs (Bigford 1994, 25).

## State Coastal Zone Management

### Purpose and Definition

Coastal management is a broad term encompassing many different meanings. For some, it is the protection of wetlands, fisheries, and coastal water quality, dunes, beaches, and other important coast resources. For others, it is the prevention of loss of life and property due to storms and erosion and other coastal area natural hazards. Yet another meaning is the provision for public coastal access and adequate space for "ports, coastal-dependent uses, . . . and other coastal development needs and priorities" (Owens 1992, 144). In 1972, the CZMA was passed "to preserve, protect, develop, and where possible, to restore or enhance the resource of the Nation's coastal zone for this and succeeding generations." Under the terms of the CZMA, the bulk of the responsibility for coastal zone management in the United States was placed at the state level of government. The states have considerable flexibility in the manner in which they fashion their management programs. This applies to the nature of their policies, the legal authorities that they employ, the regulatory processes that they decide to use, the extent to which they choose to involve their local governments in the process, and so on (Knecht and Archer 1993, 189).

According to Knecht and Archer (1993), the following policies are typical of those which must be included into state coastal management programs by a legally enforceable means:

- Identify the coastal zone boundaries subject to the management program
- Define what shall constitute permissible land and water uses
- Inventory and designate areas of particular concern
- Indicate the means by which the state will exert control over land and water uses
- Establish use priority guidance for specific areas (even those of lowest priority)
- Describe the organizational structure for implementing the management program
- Demonstrate the organizational ability to implement the management program
- Provide information showing provisions for specific areas to be designated for preserving or restoring their conservation, recreational, ecological, or aesthetic values
- Provide information showing that the management program provides for adequate consideration of the national interest involved in the siting of facilities necessary to meet requirements which are other than local in nature.

This researcher notes with interest the implications of this last item, which indicates that the program provide "adequate consideration of the national interest involved in the siting of facilities necessary to meet requirements which are other than local in nature." Among other considerations, 1980 CZMA amendments have added the requirement that "priority consideration be given to coastal-dependent uses and orderly processes for siting major facilities related to national defense, energy, fisheries development, recreation, ports and transportation, and the location, to the maximum extent practical, of new commercial and industrial developments in or adjacent to areas where such development already exists." It would be appropriate, in this instance, for the amendment to have specifically added scientific and educational coastal-dependent activities, particularly those which have national or international implications, and therefore require priority consideration for their

adequate and reasonable development. Specified under Article 7 of the California Coastal Act, Section 30255 states that coastal-dependent industrial facilities are encouraged to locate or expand within existing sites, while other coastal-dependent developments shall have priority over other developments on or near the shoreline. A closer look at state and local coastal programs will provide an indication as to what extent the spirit of this policy is put into practice. (See Chapter III.)

Several reports have documented the difficulties states have encountered in attempts to organize coastal management programs (Curley 1990, 10; Rosener 1980, 3), including the challenges of integrating newer management initiatives into coastal management programs (Clarke 1991, 17). None of these reports have dealt directly with how comprehensively the states, and ultimately local jurisdictions with adopted local coastal programs, have actually addressed national coastal management goals while using CZMA funding. However, the opportunity exists for a "national policy coordination effort to build on the work of the coastal states and the collaborative, partnership nature of the CZMA" (Owens (1992, 160). For this to occur at the local level, clear communication of interests having greater-than-local significance is of fundamental importance when devising local coastal programs and policies.

State Coastal Management Programs

The CZMA was designed to set general national goals for improved coastal management and to use approved state programs to address national and state concerns, thereby starting the notion of shared responsibility and public partnerships. States are called upon to design and implement coastal zone management programs while the federal government assists the states in their program design and provides funding support. By its nature, federally approved coastal programs have considerable flexibility in the manner in which their programs are implemented and managed. However, each program must be

able to legally enforce its contents, which includes identification of boundaries, areas of special concern, priority uses in particular areas, and adequate consideration of the national interest involved in the siting of facilities necessary to meet requirements which are other than local in nature (Knecht and Archer 1993, 190). Such interests which are "other than local" may include priority land use by coastal-dependent activities which are related to a greater understanding of the marine environment.

Management of the Land-Water Interface

Two amendments were added to the CZMA in 1990. In the first, a new priority was placed on: allowing coastal access, protection from coastal hazards, consideration of cumulative development impacts, and siting of energy and government facilities in coastal areas, as well as a host of other concerns related to a state's particular needs. A second amendment addressed the need for non-point source pollution control programs, thereby adding a new dimension to the U.S. coastal zone management program. This offered the CCC review authority over adjacent urban and agricultural areas, some outside of the previously established coastal boundaries. Inland boundaries were re-evaluated to meet these new requirements. Also of significance is the key partnership formed between the U.S. Environmental Protection Agency and the state CZM programs, via the Clean Water Act and the CZMA, respectively.

These amendments established a clear mandate for the management of activities involving the interface between land and water. Such responsibilities have resulted in (1) the management of the land-sea interface, particularly "sectoral" activities (e.g., dunes, public access, urban waterfronts, non-point pollution source areas, and siting of government and energy facilities), and (2) the integration of intergovernmental programs (and subsequently, a more integrated and comprehensive interdisciplinary approach to coastal management, involving scientific, engineering, economic, institutional, political,

legal, and social/cultural considerations). These programs create a demand for a broader spectrum of specialized, California-based knowledge and expertise which can address needs beyond simply environmental protection or the allocation of unique resources (Knecht and Archer 1993, 194; Cicin-Sain 1990, 330).

Although the U.S. coastal zone management program has been historically based on nominally scientific grounds, the incorporation of each of the natural sciences, social sciences, and engineering is uneven on a national basis. Efforts within both the National Academy of Sciences and NOAA's Coastal Ocean Program are aimed at improving the management of coastal resources through the application of better and more timely scientific information and by finding a workable interface between policy and the natural and social sciences. This complex dynamic is unique in the ranks of federalism, which otherwise has an autocratic view of program implementation. Networks of public and private organizations, and indeed coastal policy stakeholders, have influenced coastal policy in a manner consistent with the tenants of the "coproduction" model discussed by Godschalk (1992).

Under a "coproduction" federal framework, federal-state-local planning and regulation would be programmatically interwoven to consider national and local interests, particularly in the siting of facilities having implications beyond a local set of interests (Godschalk 1992, 100). Equally important under this model are a balanced expansion of the roles of nongovernmental organizations, such as scientific and conservation groups, and a new intellectual phase of coastal management marked by greater breadth of vision. Under this vision, "coastal scholars and managers are beginning to ponder fundamental choices among contrasting management philosophies, interrelationships among coastal and marine management, links between coasts and the broader canvas of the global environment, and ways of developing more effective, flexible partnerships between public and private sectors" (Mitchell 1986, 345).

As recently as 1981, it was recognized that the role of local and state governments with respect to ocean programs and activities would require increased attention. Federal programs were not coordinated with state and local programs, and, in fact, many local government planning units went unrecognized (Armstrong and Ryner 1981, 90). At the same time, more coastal areas were becoming extensively developed and subject to comprehensive planning, making the availability of coastal sites for large-scale development (i.e., energy development) diminish. Local opposition to large-scale development raised claims by sponsors that local entities were either selfish or lacked an appreciation of the national interest. However, local concerns are often reasonable since local communities bear the "cost" of large-scale development. Proposals by these various sponsors appear from time to time calling for mandatory accommodation of major facilities; however, this approach is not feasible.

Wilder (1993) discusses OCS land development issues in the context of cooperation among federal, state, and local governments. What must be remedied is the "national benefit at local cost" approach associated with development proposals having unbalanced or narrowly focused impact assessments, specifically those which fail to adequately address external costs. These large-scale development proposals require that a long-term perspective be infused into the decision process. More effective proposals would include provisions for environmental protection, economic growth, an increased knowledge-base or educational opportunity for the community, and shared responsibility in establishing a more holistic ecology.

The concept of integrated coastal management follows these tenets, in which coordination between central and regional/local government must reach a sufficient level in order to resolve conflicts (Knecht and Archer 1993, 188). A truly integrated and comprehensive approach to coastal management will involve scientific engineering, economic, institutional/political, legal, and social/cultural considerations. Coastal

management programs bring a broad spectrum of specialized knowledge to areas requiring resource conservation. Programs such as NOAA's Coastal Ocean Program and Sea Grant College Program are examples of a direct infusion of local benefits arising from federal coastal programs.

Crawford (1993) recognizes each of the elements most likely to link federal, state, and local stakeholders using the co-production model presented by Godschalk. The first element is a strategy that seeks well-trained coastal management professionals for organizations at all planning levels. Increases in local expertise and human and institutional capacity are encouraged. Promotion of marine research and education is suggested, with examples modeled after the agricultural land grant programs which are already well established (and which the Sea Grant Program strives to emulate). Such training and education, says Crawford, should be linked to short-term goals at the local level. Likewise, a linkage between the agenda of constituents (or stakeholders) and policy makers must be established, perhaps through incentives associated with improved education, training, economic and technical assistance, or visitor-serving programs and public outreach.

Knitting together the interdependent values and responsibilities of international, national, regional, and local entities involved in coastal resource management requires a clear articulation of common purpose and long-term objectives. Success requires a series of "nested," or overlapping, strategies to address planning at a scale broader than the local or even state levels of government. Such strategies should empower local constituents and government to play a major role in developing regional strategies and to be an integral part of a national strategy.

While local constituents may avoid change, particularly constraints posed by national plans and strategies, their priorities must be given due consideration and addressed by better awareness, education, communication, and a commitment to sound policy

(Kenchington and Crawford 1993, 118). In essence, coproduction beyond state implementation of general national goals requires the inclusion of local stakeholders into complex policy decisions and a sensitivity to local needs, a concept which has not always been readily embraced at the federal level (Owens 1992, 145).

## California Coastal Act

Purpose and Definition

The California State Coastal Act of 1976 was enacted to address conservation and development issues along coastal shores and waters. The CCC, created under the Coastal Act, provides coastal management and regulatory agency guidelines and policies to wisely protect and utilize the state's coastal resources. The Coastal Act also provides a means of local involvement in state-wide policy decisions which affect a local area. In addition to establishing policies associated with coastal access, loss of wetlands and prime agricultural properties, urban growth patterns, and sources of energy, the Coastal Act gives priority to coastal-dependent developments. It states that "coastal-related development shall be accommodated within reasonable proximity to the coastal-dependent uses they support" (California Coastal Commission 1993, 47). Local input is provided chiefly via an approved and adopted LCP. LCPs must conform with the stated policies, procedures, and guidelines enforced by the CCC and stated in the Coastal Act. The CCC may, from time to time, recommend that an LCP be amended to accommodate uses of greater than local importance, should they not be permitted by the applicable certified LCP (California Coastal Commission 1993, 98). For significant projects one might presume that certain coastal-dependent uses may fall into the category of a coastal use having "greater than local importance."

Local Coastal Plans

Local coastal plans are to give "due consideration" to developments associated with the study, preservation, and protection of "sensitive resource values" within publicly owned land and water areas. These activities are often dependent on access to and use of coastal resources within the coastal zone. It is also incumbent upon every state agency subject to Section 30525 of the Coastal Act to "advise the appropriate local government of particular considerations that should be evaluated during the preparation of a local coastal program and which . . . may be necessary to protect identified sensitive resource values" (California Coastal Commission 1993, 101).

The State Legislature added the provision that certified LCPs not be so detailed so as to require constant revision for minor changes. Likewise, the Coastal Act recognizes that applicable policies and the level of specificity required to ensure coastal resource protection may differ between areas on or near the shoreline and inland areas. LCPs are important as a repository for accumulated resource assessment as well as for guiding policies affecting growth within the urbanized coastal zone. For example, state agencies are to advise preparers of LCPs as to the identification of sensitive resource values which are susceptible to adverse impacts from nearby development. The contributing agency shall even identify the location and type of development that would have a significant adverse impact on those sensitive resource values, and the appropriate considerations that must be made to protect the resource.

Note that, "sensitive resource values," such as fragile or unique natural resources contained in the Monterey Bay, are particularly susceptible to degradation resulting from surrounding development. Areas exist in which environmental degradation has not been adequately mitigated or avoided. Such unique areas, as defined in Section 30107.5 of the Coastal Act, are those suited for scientific or educational purposes, and specific public recreation areas dependent on the character of the surrounding area. Though clearly a form

of development itself, coastal-dependent facilities contributing to the research and understanding of marine resources may fall within this provision of the Coastal Act. It may be extrapolated that "scientific" and "educational" activities, and often "coastal-dependent" and "coastal-related" land uses, are clearly subject to some degree of interpretation at the local level. As will be discussed, some interpretations, while conforming to the language and general spirit of the Coastal Act, vary from jurisdiction to jurisdiction.

LCPs have sometimes been given the option to accept CCC recommendations asking that land uses of greater than local importance be accommodated, even if they are not currently permitted under the approved LCP. The CCC's recommendations to local government may be either general or specific, as stated in Section 30519(c) of the Coastal Act. This provision would enable coastal-dependent and coastal-related land uses (even those that have components which are not strictly coastal in nature) to be allowed within areas where such uses were generally prohibited. For example, classrooms which are associated with a coastal studies endeavor may be allowed near a coastal site to enhance the overall usefulness and quality of the educational facility and its research activities.

A coastal zone management program that encompasses "intersectoral" activities across ocean-land boundaries is more likely to transcend the label of simply being a land use control program. Connecting water quality and ocean resource issues with land use, education, and research activities, provides a basis for an effective and integrated coastal management policy. A truly integrated approach is then achieved, with faster participation from the scientific, engineering, economic, political, legal, and social communities of stakeholders. It is the opportunity to achieve greater national and international "intersectoral" policy objectives via research and education efforts that warrants special consideration by local entities when siting coastal-dependent facilities.

The link between fostering scientific and educational contributions in marine sciences and making sound policy decisions, at the regional, state, and national levels, is

fundamental to proper resource allocation. Most marine policy decisions are resource allocation decisions, which require that knowledge about the health and abundance of the resource be provided from the scientific community (Young 1989, 3). However, marine policy decisions also involve the personal values and beliefs of those making the decision and those affected by the decision; science will tell us "what is right, or true, or correct, but what is better must be debated and decided via a policy-making process" from all levels involved (Huffman 1991, 12).

By virtue of the study area's proximity to a National Marine Sanctuary having unique marine resources, it is clearly deserving of intensive scientific study. To achieve this, the community or local jurisdictions must endeavor to accommodate relevant scientific, educational, and resource-sustaining industries by granting them priority over other land uses. In turn, by properly siting such facilities, related commerce, prestige, and diversity are brought to these communities. This category of coastal-dependent or coastal-related facility can be linked to federal jobs or federal funding of local institutions, through grants, research partnerships, and coordinated studies. Once a region has been identified (e.g., the MBNMS) and the need for scientific activities ascertained and prioritized, the next step is political commitment to the assessment process (Hildreth 1994, 123). This commitment includes the administrative mechanisms contained within marine centers of excellence (e.g., Research Advisory Committees and Activity Panels) that will allow recognized priorities to be realized.

As with the concept of integrated coastal management, accommodating coastal dependent land uses requires concerted coordination between various levels of government, as well as the planning of activities across the land-water interface (Knecht and Archer 1993, 188). There are already examples of both dimensions operating together, chief among these are the Coastal Zone Management Program, the Sea Grant College Program,

the Pacific Northwest Regional Marine Research Program, and, more locally, the Coastal Non-point Pollution Control Program (Crawford, Cobb, and Friedman 1993, 316).

## Regional Coastal Zone Management

Past and Present

With the passage and development of the federal CZMA in 1972, and its reliance on state implementation of coastal management plans, some compromises have been made at the local planning level with regard to coastal resources and coastal-area development. However, it is at the local level where coastal management programs can be best formulated and most effectively implemented. Local government possesses the authority to effect change in coastal management via ordinances, zoning requirements, by creating incentives. Effective incentives include differential taxation or encouraging capital investments in particular locations. These techniques have been used with success in areas where natural hazards, such as hurricanes or flooding, can have a severe impact on lives and property.

Local initiatives can be powerful and sweeping, such as the 1986 Coastside Protection Initiative in San Mateo County, which severely restricts development within 5 miles of the coast. Their local policy places limits on the amount of allowable residential square footage, use of substandard lots in urban coastal areas, and the use of water. Water restrictions affect both residential housing starts and certain service-related industries particularly hard.

An orderly and efficient transition between urban and rural land use is needed for both development and infrastructure. Effective management resides as the local planning level, where coastal growth controls should adhere to an overall managed urban development scheme. Development should be directed toward *urban growth boundaries* and away from resource lands. Only developments related to resource activities should be allowed in

sensitive areas (Moore and Nelson 1993, 198). To achieve this in some urbanized settings, creative land development schemes are necessary which utilize existing space to the maximum extent possible, but still maintain other jurisdictional elements (i.e., visual quality, recreation and parking needs, or sufficient coastal access).

Local and regional government not only grapples with growth issues associated with the urbanization of natural, rural, or agricultural coastal properties, but also the degradation of water quality adjacent to coastal properties. Water quality can be protected through regulation of point and non-point sources of water contamination. Water quality directly impinges upon the quality of life, as well as the operational requirements for some coastal-dependent land uses.

## Monterey Bay National Marine Sanctuary

The regulatory and programmatic influences within the central coast study area include not only those associated with the CZMA, but also those associated with the designation of adjacent waters as a national marine sanctuary. Title III of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, authorizes the Secretary of Commerce to designate discrete areas of the marine environment which have special national significance as national marine sanctuaries. Sanctuary status is intended to ensure comprehensive management and protection of an area's natural, educational, or aesthetic resources and qualities.

Congress directed the NOAA to designate Monterey Bay as a national marine sanctuary to enhance resource protection and preserve the natural beauty and bounty of the marine ecosystems within the sanctuary's boundaries (U.S. Department of Commerce, NOAA 1993, 1). This goal is best achieved by pursuing a better understanding of the Sanctuary environment and improving management decisions via the exchange of information

between research agencies, institutions and organizations. Prior to the designation of the MBNMS, numerous regulatory activities were not carried out in the context of a comprehensive management plan, and no organizational structure existed to coordinate research and regulation.

The Monterey Bay has a unique and biologically diverse marine ecosystem of regional and national significance. Sanctuary status allows for coordinated coastal zone management and research at the regional level. This enables programs such as the Elkhorn Slough National Estuarine Research Reserve to be integrated with facilities and resources that are part of the adjacent MBNMS. The sanctuary designation did not alter fishing regulations, and prohibitions that may indirectly affect fishing activities do not apply to traditional fishing activities, mariculture, and kelp harvesting. The Final Environmental Impact Statement/Management Plan (FEIS/MP) for the MBNMS identified at least 13 research and/or education programs adjacent to its waters (U.S. Department of Commerce, NOAA 1992a, II-91). The opportunity to coordinate and expand existing research efforts among these activities was recognized as an outcome of Sanctuary status.

For several reasons, the MBNMS has the potential to become one of the most successful marine sanctuary programs ever. Monterey Bay is truly a site of unusual recreational, ecological, historical, research, educational, and aesthetic quality. The Bay may be the most intensely studied and monitored sanctuary managed by NOAA. The number of high-quality marine research laboratories in the area provides NOAA with a multitude of information sources and a means of providing the public with a clear interpretation of our changing marine environment. An ability to coordinate efforts inside and outside of government will be key in promoting a wise, diverse use of lands adjacent to the MBNMS.

# III. COASTAL-DEPENDENT AND COASTAL-RELATED LAND USE ON THE CENTRAL CALIFORNIA COAST

## Definition of Coastal-Dependent and Coastal-Related Land Use

California Coastal Commission

The California Coastal Act (1976) defines a coastal-dependent development or land use as "any development or use which requires a site on or adjacent to the sea to be able to function at all." Coastal-related development means "any use that is dependent on a coastal-dependent development or use." Development is defined by the occurrence of an array of actions, but principally includes the placement or erection of any solid material or structure (building, road, pipe, utility line); discharge or disposal of waste; grading, removing, dredging or mining of materials; land use changes; use by utilities; and harvesting of vegetation such as kelp.

The definitions described above are repeated in most of the local coastal programs prepared by central coast counties and cities. However, within these documents, as will be shown, several embellishments to the term "coastal-dependent" have been added. Some examples include:

- "Coastal-dependent industry" (light and heavy)
- "Coastal-dependent operations"
- "Shoreline dependent"
- "Coastal resource-dependent uses"

- "Coastal-related recreational opportunities" (golf)
- "Coastal dependent . . . environment(s)"
- "Marine-related research"
- "Marine-related activity"

Other Water-Dependent Activities

While the definition of coastal-dependent and coastal-related activities may include a wide range of activities, those which are water-oriented recreational activities are excluded from consideration here. These recreational coastal-dependent activities are considered to be an entirely separate category of coastal-dependent activity. Article 3 (Recreation) of the Coastal Act states that: "coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses." These oceanfront recreational land uses are given priority over private residential, general industrial, or general commercial development, but not over agriculture or coastal-dependent industry. However, for aquaculture (which includes mariculture) Section 30222.5 of the Coastal Act states that ocean-front land that is suitable for coastal-dependent aquaculture "shall be protected for that use, and proposals for aquaculture facilities located on those site shall be given priority, except over other coastal dependent developments or uses."

Article 6 (Development), Section 30255, states that: "Coastal-dependent developments shall have priority over other developments on or near the shoreline. Except as provided elsewhere in the division, coastal-dependent developments shall not be sited in a wetland. When appropriate, coastal-related developments should be accommodated within reasonable proximity to the coastal-dependent uses they support." Section 30260 addresses coastal-dependent industrial facilities, stating that they shall be

> encouraged to locate or expand within existing sites and shall be permitted reasonable long-term growth where consistent with the division. However, where new or expanded coastal-dependent industrial facilities cannot feasibly be accommodated consistent with other policies of this division, they may nonetheless be permitted in accordance with this Section, and Sections 30261 and 30262, if: (1) alternative locations are infeasible or more environmentally damaging, (2) to do otherwise would adversely affect the public welfare, and (3) adverse environmental effects are mitigated to the maximum extent feasible.

Sections 30261 and 30262 address the use of tanker facilities and oil and gas development, respectively.

Definitions of the terms "coastal-dependent" and "coastal-related" do vary from application to application. One of the broadest and most open-ended definitions found, and which has been elaborated upon in Chapter VI, Case Studies, was prepared for the *Terrace Point Specific Plan* (dated March 23, 1994). Their definition is somewhat paradoxical and quite broad although some portions are quite specific. It reads:

> Coastal Dependent/Related is land designated for uses that benefit from, or require direct or nearby proximity to, the ocean and Monterey Bay National Marine Sanctuary, or are associated with coastal resources and coastal dependent uses such as coastal related research, education, government regulation, business and aquaculture uses. A limited area for project-serving commercial and day care uses is allowed.

Several portions of this definition diverge from that of the CCC or other regional LCPs. The ambiguity resides in the reference to land which is "designated" and uses that "benefit" from their proximity to the ocean. These terms significantly broaden one's interpretation of what uses might be considered coastal-dependent. The inclusion of the MBNMS as part of the definition's criteria, on the other hand, appears to be unnecessarily specific. Their inclusion of coastal-related government regulation and business uses under the guise of a coastal-dependent use appears to be a very liberal interpretation.

Given the preferential status provided to coastal-dependent and coastal-related activities under the Coastal Act, it would appear that such activities would have clear priority whenever other lower priority uses are concurrently vying for a particular coastal property. However, the ratio of non-recreational coastal-dependent/related activities to general residential/commercial/industrial land uses is small; hence, it is typical for a coastal property

to be developed in lieu of any concurrently competing coastal-dependent uses. A lack of prior recognition of these specialized land use needs has led to the traditional developmental pattern along the coast, which emphasizes non-coastal dependent recreation, housing, or commercial development. In the absence of any specific coastal-dependent project, traditional development will continue uncontested. It now appears that the potential for new or additional coastal-dependent activities is increasing, while many of the most appropriate coastal sites are already encumbered or otherwise predisposed (as shown in the geographical analysis in Chapter V).

The Coastal Act has also set forward provisions for the special protection of marine resources and areas, or species of special biological or economic significance. Under Section 30230 of the Coastal Act, the marine environment will be used "in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific and educational purposes" (California Coastal Commission 1993, 40). This provision, by definition, includes the maintenance of coastal conditions so that coastal resource dependent activities can function at a meaningful and sustainable level. A broadened definition of coastal-dependent land use should consider language such as this, in that it promotes land uses that are part of a larger resource conservation strategy.

## Coastal-Dependent and Coastal-Related Activities

General

General categories of coastal-dependent and coastal-related activities associated with this research effort are as follows:

- Research and Education - Privately funded research institutes, state university marine science programs, laboratories, field studies, basic and applied research, collaborative monitoring efforts, and degreed marine programs;
- Government - Marine resource research, regulation, monitoring, management, and program funding by local, regional, state, and federal agencies (excluding recreation and regulation of ocean activities);
- Industry - Commercial and industrial activities, such as aquaculture and mariculture, coastal energy facilities, kelp harvesting, ocean-based pharmaceutical and agricultural products (excludes commercial fishing, off-shore energy development, and transportation).

Coastal-Dependent and Coastal-Related Research Activities

Based upon the *Central Coast Marine Science Research Directory* (1990) prepared by former-Assemblymember Sam Farr, a sample of research disciplines associated with coastal-dependent land uses are as follows:

General Research Activities include:

| | | |
|---|---|---|
| Botany | Chemistry | Computer Science |
| Ecology | Engineering | Environmental Science |
| Geology | Geography | Oceanography |
| Physical Science | Physiology | Zoology |

Specific Research Activities include:

- Air-Sea Wind Field Mapping
- Biochemical Toxicology
- Bioenergietics
- Biogeochemistry
- Climatology
- Coastal Current Mapping
- Coastal Engineering
- Coastal Ocean Modeling
- Computer Science/Databases
- Fish Toxicology
- Fish Population Census
- Kelp Toxicology
- Kelp Forest Ecology
- Mapping, Charting, Geodesy
- Marine Archaeology
- Marine Mammal Behavior
- Marine Geology
- Marine Geophysics
- Marine Parasitology
- Marine Plant Biology
- Marine Population Ecology
- Marine Molecular Biology
- Natural Products Chemistry
- Nearshore Wave Dynamics
- Neurophysiology (marine organisms)
- Ocean Acoustics
- Ocean Dynamics
- Oil Dispersant Chemistry (seawater)
- Optical Oceanography
- Paleogeochemistry
- Pesticide Monitoring
- Seabird Biology
- Slough Restoration Ecology
- Slough Hydrology
- Submarine Canyon Processes
- Trace Metal Analysis
- Trace Synthetics/Petroleum Analysis

Table 1 indicates the relative frequency with which various coastal-dependent activities are performed by government research, education, and mariculture organizations. Relative frequency is based upon interviews with knowledgeable individuals and by a review of mission statements and budget allocations prepared by government, education, and research organizations.

**Table 1. – Coastal Dependent Activities by Organization**

(+ = Often; +/- = Sometimes; - = Rarely)

| Coastal Activity | Government | Institutions | Education | Aquaculture | Other Industry |
|---|---|---|---|---|---|
| Applied Research | + | + | +/- | +/- | +/- |
| Basic Research | + | + | + | +/- | - |
| Marine Educational | + | +/- | + | - | - |
| Energy Production | +/- | +/- | - | - | +/- |
| Extraction & Processing | +/- | - | - | + | + |
| Manufacturing | - | +/- | - | + | + |
| Recreational | + | - | +/- | - | - |
| Regulatory | + | - | - | - | - |
| Resource Monitoring | + | + | + | +/- | + |
| Resource Preservation | + | +/- | +/- | - | - |
| Visitor-Serving | + | + | +/- | - | - |
| Vessel Use | +/- | +/- | +/- | +/- | +/- |

## Coastal-Dependent Land Uses and Organizations in the Monterey Bay Area

The central California coast and Monterey Bay contains a unique set of oceanographic characteristics. Many of these are related to major oceanic and atmospheric circulations, the contours of the sea floor, and the geological structure beneath the ocean floor. Located between subtropical and temperate climatic zones, the central coast experiences seasonal changes in prevailing winds. During summer a semi-permanent high pressure system creates a steady northwest component to the wind field which drives ocean surface currents. When combined with the Coriolis force, surface waters are directed away from the coast and replaced by cooler, nutrient-enriched water from below. During the winter months, a northerly ocean current provides a temperate climate and biological productivity subsides until early spring. This complex ecosystem produces one the richest concentrations of marine fauna and flora in the world. Diverse habitats which exist in the region include the tidal mudflats of Elkhorn Slough, the kelp forests of the Monterey Peninsula, the submerged Monterey Canyon, rich intertidal reefs, and expansive dune environments. These habitats support countless species of invertebrates, a wide diversity of marine mammals, and numerous species of seabirds.

Because of its unique marine resources and vast research and educational value, several marine laboratories and governmental programs associated with coastal issues plan to relocate to the central coast, many of which are important from a national and international perspective.

In December of 1991, eight research institutions were identified in the project area (U.S. Department of Commerce 1991b, 3). The June 1992 MBNMS FEIS/MP identified at least 10 research and education facilities in the project area (U.S. Department of Commerce, NOAA 1992a, II-91). Based upon further review by Dr. Gary Griggs,

Director of the Marine Sciences Institute, University of California, Santa Cruz, no less than 18 marine research and education facilities currently exist or are planned. Researchers, staff, and graduate students for all these facilities combined number over 1,600, with an annual budget of $113.35 million (Griggs 1995, unpublished).

These existing and planned facilities, divided by educational, government, and private sponsors, are discussed below.

Educational

1. *Institution*: Hopkins Marine Station (Pacific Grove)

   *Sponsor*: Stanford University - Department of Biological Sciences

   The Hopkins Marine Station is a teaching and research facility that operates as a branch of the Department of Biological Sciences at Stanford University. The Pacific Grove facility focuses on the biology of marine organisms, especially the interaction of organisms with their environment. Its goal is to address fundamental questions that were previously unanswerable, providing a new understanding of and novel perspectives on marine biological and biological oceanographic problems. Work is directed at fundamental aspects of biology as derived from marine organisms, and its application to marine biology in general. For example, the description of growth hormone in fish and invertebrates is considered relative to the application of these growth hormones for mariculture. Studies of cell development have led to new understandings about how pollutants affect marine organisms.

   Hopkins Marine Station is situated on 11 acres of granite headlands and beaches along the south shore of Monterey Bay. Built in 1891, it is the oldest marine laboratory on the West Coast and the second oldest in the nation. It is financed by endowment income and provides work towards graduate degrees in various marine-related disciplines. Facilities include four main buildings: the Agassiz Laboratory, the two-

story Jacques Loeb Laboratory, the Lawrence Blinks Laboratory, and the Monterey Boat Works building. All laboratories have running seawater and separate dive lockers and showers. A new, 9,000-square-foot library has also been added. The annual operating budget is $3.5 million and supports up to 70 personnel (45 students). Collaboration with the Monterey Bay Aquarium occurs through sharing seawater pumped to the Hopkins Marine Station site by the aquarium (Thompson 1995). A new two-story laboratory building is slated for construction. The facility will contain a small aquarium on the first floor with laboratory and office space above. Expansion options are limited on this property, with one remaining view corridor and a parking area as the only possible options remaining.

2. *Institution*: Long Marine Laboratory (Santa Cruz)

   *Sponsor*: University of California, Santa Cruz - Institute of Marine Sciences

   The Joseph M. Long Marine Laboratory (LML) is an outgrowth of the Organized Research Unit, an active marine sciences educational and research program, approved in 1976. Its mission, to encourage, facilitate, and strengthen marine research and instruction, is accomplished via an excellent seawater system and research facilities designed to enhance marine research and instruction and provide technical and administrative support.

   Marine science activities involve the support and participation of 23 academic faculty members from five departments: Biology, Chemistry, Physics, Earth Sciences, and Marine Sciences, as well as 21 adjunct faculty and researchers in the areas of oceanography, marine biology, marine geology, and environmental toxicology. LML uses running seawater pumped from the adjacent coast for tanks to support dolphin, seal, sea lion, sea otter, and seabird research, in addition to laboratory research.

Access to nearshore waters is provided by a variety of small boats. Use of larger vessels for open ocean research is available through collaboration with other programs.

Expansion of existing facilities into an adjacent property known as Terrace Point has been proposed over the last several years and is currently being planned to accommodate several coastal-dependent and coastal-related activities. The latest proposal would allow the Lab to quadruple its lab space and build a visitor center (Griggs 1995). In addition, 664,000 square feet of research space would be made available to accommodate the possible addition of 25 scientists from the National Marine Fisheries Service, 150 employees and scientists from the U.S. Geological Survey's Pacific Branch of Marine Geology, and tanks and equipment for use by the California Department of Fish and Game's Oiled Wildlife Rescue and Rehabilitation Facility. The Lab's operating budget is $5.5 million with a staff of approximately 133 (including 93 students).

3. *Institution*: Moss Landing Marine Laboratories (Moss Landing)
   *Sponsor*: California State University System

   Moss Landing Marine Laboratories (MLML) is an upper-division undergraduate and graduate marine education and research facility. MLML seeks to train scientists in marine biology, descriptive physical oceanography, biological oceanography, marine chemistry, and geology, by emphasizing research and investigation in the field. Student enrollment at the 24,000-square-foot Moss Landing facility was approximately 110 students prior to the 1989 Loma Prieta earthquake. Since the earthquake, students have primarily been using temporary facilities in Salinas, although some coastal field studies are performed at the original Moss Landing site. MLML intends to replace its damaged facilities with a new lab on a knoll in Moss Landing overlooking the Old Salinas River; however, delayed federal funding and several environmental compliance

hurdles have slowed progress on this proposal. (See Chapter VI for additional information.)

The Lab was originally established in a cannery which the Beaudette Foundation for Biological Research had converted into a private research facility. In 1966, the San Jose State University Foundation, acting with assistance from four other California State College foundations and a National Science Foundation grant, purchased the property and established the MLML.

Prior to the Loma Prieta earthquake, the Moss Landing facility was very active as a research program. During 1986, faculty members had support from a dozen private, state, and federal granting agencies. Currently, laboratories and classes are located 12 miles from the coast and use trailers with limited space for students and equipment. James Nybakken, Acting Director of the Lab was recently quoted as saying, "We have almost no room for our students and very few places where they can work. A lot of our grants are in jeopardy because we're 12 miles from the ocean and we just can't do certain things. The logistics are very, very difficult" (Chui 1994, 4B).

The MLML has played an integral role in the community, increasing awareness of environmental issues through educational outreach and as stewards of the surrounding habitat. The lab has also participated in teacher education programs and training volunteers for sites in Elkhorn Slough and around Monterey Bay. MLML scientists and graduate students have worked on numerous projects to assess recreational and commercial fishery resources, including projects involving such important commercial resources as kelp, abalone, squid, rockfishes, flatfishes, sharks and rays, and pelagic fishes. Moss Landing Harbor supports a major commercial fishing fleet. The MLML annual operating budget is $3.0 million with up to 150 facility, staff, and students utilizing the facilities.

A host of new and highly specialized laboratory equipment, storage facilities, and computer hardware/software is planned for a newly proposed 52,486-square-foot facility south the Moss Landing Harbor at a site known as "Water Tower Hill." While many issues have been addressed in order to complete the environmental process, the proposed project is likely to move forward at the preferred site (Oliver 1995).

Governmental

4. *Institution*: Branch of Pacific Marine Geology (Long Marine Lab-proposed)
   *Sponsor*: U.S. Geological Survey

The Branch of Pacific Marine Geology (BPMG) is that branch of the U.S. Geological Survey (USGS) which conducts marine geological, geophysical, and geochemical studies of seafloor regions in the Pacific and Arctic Basins and their margins under the auspices of the Marine and Coastal Geology Program. The program is focused on four major themes: environmental quality and preservation, geologic hazards, seafloor resources, and public information. Areas of seafloor and sediment contamination and disposal are investigated, as are pristine sanctuaries and reserves, in order to better understand natural processes and the impact of anthropogenic changes. Geologic hazards studied include chronic coastal erosion, coastal and offshore landslides, and tectonic hazards imposed by submarine faulting and tsunamis.

The USGS marine program is currently expanding its capability to provide timely and relevant information to collaborators, policy makers, and the general public through increased emphasis on information dissemination. To meet their expansion needs and to fulfill a desire for a coastal site, the BPMG has signed a Memorandum of Understanding, and is developing a cooperative agreement with the University of California, Santa Cruz to collocate at the Long Marine Lab in mid-1996. The USGS has a long history of collaboration with UCSC's Institute of Marine Sciences, though

shared research activities, adjunct professorships, and other activities (Edwards 1993). While significant budgetary hurdles exist under the newly elected Congress, the proposed USGS facility at Long Marine Lab, if funded, would replace the existing Deer Creek facility in Palo Alto, California. Of an expected 146 staff members in the sciences group, 47 senior research staff, 26 intermediate researchers, 25 technical support, and 24 computer and programming specialists would be relocated.

5. *Institution:* Oiled Wildlife Rescue and Rehabilitation Facility (Long Marine Lab)
   *Sponsor*: California Department of Fish and Game

   In 1991, the Office of Oil Spill Prevention and Response (OSPR) was created within the Department of Fish and Game to respond to and prevent oil spills in California's coastal waters. According to the LML Master Plan, this facility, with its laboratories and outdoor tanks, would use an existing Coastal Development Permit provided for under legislation written by then-Assemblyman Sam Farr and authorized in 1990. As part of Sam Farr's vision of Monterey Bay as a center of marine excellence, this legislation suggests that the LML become the main research and rescue station along the California coastline (Quarnstrom 1991, 1B). The $4.5 million, 2-acre facility has been designed and construction is planned in 1995.

6. *Institution*: A partnership between the Elkhorn Slough National Estuarine Research Reserve and the Elkhorn Slough Foundation, a private organization (Moss Landing)
   *Sponsors*: Sanctuaries and Reserves Division (NOAA) and California Department of Fish and Game.

   The National Estuarine Research Reserve Program provides information and models on how to best manage the nation's estuaries. The 1,400-acre Elkhorn Slough Reserve was the first established in California in 1978 and is now one of 22

nationwide. The Reserve Program and the non-profit Foundation, under joint management between NOAA's Sanctuaries and Reserves Division and the California Department of Fish and Game, help to protect and manage one of the few relatively undisturbed coastal wetlands remaining in California. The Reserve Program is managed in a manner that provides a natural outdoor laboratory setting, attracting researchers from both the fields of oceanography and limnology.

A primary function of the National Estuarine Reserve is education and research. Information gained from this research is provided to local, state, and federal decision-makers to assist in the management of the nation's coastal zone. A new interpretive center at the Reserve provides an active environmental education program where students can learn about salt marsh wildlife and resources. The Reserve maintains strong ties with local scientists and provides research opportunities for student interns from a number educational institutions. The Reserve also offers recreational opportunities for the general public, such as hiking and nature observation and photography, among other activities.

7. *Institution*: Naval Postgraduate School, Departments of Oceanography and Meteorology (Monterey)

   *Sponsor*: U.S. Department of Defense, Department of the Navy

   The departments of Oceanography and Meteorology provide postgraduate degrees for military officers and have produced over 4,000 graduates with M.S. and Ph.D. degrees since the establishment of these programs in 1968 and 1946, respectively. The overall research goal of the Department of Oceanography is the study of physical oceanography, with programs on improving ocean prediction. This goal is pursued through four particular subject areas: acoustical oceanography, coastal and nearshore oceanography, ocean modeling, and air-sea interaction. The school shares access to the

research vessel maintained by Moss Landing Marine Laboratories. The Department of Meteorology is focused on the research of numerical modeling for weather prediction and climatology, geophysical fluid dynamics, analysis of atmospheric systems, among other meteorological disciplines.

8. *Institution*: Ocean Applications Branch, National Ocean Service (Monterey)
*Sponsor*: National Oceanic and Atmospheric Administration

NOAA's Ocean Applications Branch was established in 1985 as a national center for the development, exchange, integration, and dissemination of oceanographic products and services in support their high priority marine programs. The Civilian Navy Oceanographic Data Distribution System was created to provide the civilian community with routine access to the Navy's data and products in Monterey. It is ostensibly a center for coordination and collaboration between NOAA and other marine agencies, programs, and institutions. Programs fall in to three areas: ocean data management, ocean modeling, and ocean research. Highest priority has been directed towards the development of a system for providing direct access to marine data by a wide variety of users.

In 1988, NOAA created the Center for Ocean Analysis and Prediction (COAP) to seek a more focused and productive way for NOAA to work with the Navy. The goal was to develop and improve the ocean data and model output products that would be jointly produced by NOAA and the Navy in the future. Prior to 1991, the Ocean Applications Branch operated and the Ocean Applications Group under COAP. Since September 1991, it has been known as the Ocean Application Branch under the National Ocean Service. The annual operating budge is $610,000, with about 14 personnel overall.

Future activities will be aimed at providing a relational database through which each of NOAA's many forms of data storage and retrieval can be accessed more easily. An integrated data management system would link NOAA's different offices. This system will facilitate communication between the five different line organizations now involved in oceanographic data and products. Proper hardware, software, local area networks, and access to the INTERNET will be installed to support the data management system. Spin-off projects include: an education project which allows teachers to access data and information from NOAA and use it to teach science; the *Ocean PC* project, which uses inexpensive personal computers to link a library of existing software programs in order to facilitate two-way communication of global observations, data, and products; and a local data distribution system which will provide local environmental data to key users in the marine community. Local data users are expected to include the Coast Guard, the various Harbor Masters, boating and fishing organizations, and the local research community.

9. *Institution*: Pacific Fisheries Environmental Group (Monterey)

*Sponsor:* NOAA, National Marine Fisheries Service

The Pacific Fisheries Environmental Group (PFEG) began in 1967 as a cooperative agreement between the former Bureau of Commercial Fisheries and the Navy's Fleet Numerical Oceanography Center. PFEG was not formally established until 1969. It is the only laboratory in the National Marine Fisheries Service that focuses on ascertaining a comprehensive assessment and understanding of the fundamental effect of natural environmental variability on living marine resources. This group concentrates on determining how commercial fish populations are affected by natural environmental variations interacting with human action. The PFEG became part of the Southwest Center of the National Marine Fisheries Service in 1976 and is now located with the

Fleet Numerical Meteorology and Oceanographic Center in Monterey. PFEG's principal research areas include the development of environmental index time series; diagnostic studies of marine environmental anomalies (such as El Niño); identification of environmental/biological casual linkages; interregional comparative studies; and development of environmental-dependent fishery modeling methodology. Given the large spatial and temporal scales studied, this organization collaborates extensively with scientists from several nations. Improvements in PFEG's work will invariably come about from major upgrading of programs directly supplying it with data, such as the Fleet Numerical Oceanography Center (FNOC). Sponsorship from agencies such as NOAA's Climate and Global Change Program and the Coastal Ocean Program may also lead to improvements in PFEG's work (U.S. Department of Commerce, NOAA 1991b, 38). PFEG has an annual operating budget of $500,000 and a staff of approximately 10 individuals.

10. *Institution*: Fleet Numerical Meteorology and Oceanographic Center (Monterey)
*Sponsor*: Department of the Navy

Fleet Numerical Oceanography Center (FNOC) is the U.S. Navy's real-time prediction center for global-scale and regional-scale oceanographic, atmospheric, and derived applications products. Operating continuously, FNOC provides services to the Defense Department and a broad spectrum of civilian interests. FNOC maintains the world's most complete global real-time oceanographic and atmospheric database in conjunction with numerical oceanographic and atmospheric supercomputer modeling. FNOC began in 1958 as the Navy Numerical Weather Problems Group. The group moved from Suitland, MD, to Monterey in 1959 in order to collaborate with meteorologists at the Naval Postgraduate School. FNOC products include global atmospheric analyses and forecasts, ocean analyses, and a variety of tactical weather

and oceanographic applications and support for defense purposes and for search and rescue aircraft, ships, and submarines. A multi-year, $100-million hardware, software, and communications equipment upgrade is planned with the acquisition of a Cray supercomputer. FNOC also envisions several areas for expanded collaboration with NOAA, such as the integration of operational oceanography between the two agencies for ocean modeling. Counting over 50 officers, 100 enlisted personnel, and over 180 civilian personnel, at least 330 positions currently operate under an annual budget of $19 million.

11. *Institution*: Monterey Bay National Marine Sanctuary Office (Monterey)

*Sponsor*: NOAA

A sanctuary office was established in Monterey to manage and direct programs and committees created in response to the October 1992 creation of the Monterey Bay National Marine Sanctuary. The goal of the Sanctuary Office is to provide an integrated program of resource protection, research, and education to assist in the long-term management and protection of its resources. The Sanctuary Office functions as a focal point for collaborative efforts performed among federal, state, and local agencies, and includes the formulation of policies and implementation procedures. For this activity, a Sanctuary Research Action Panel (RAP) has been established. Committee members include directors and managers of the major marine-related labs, institutes, and agencies within the sanctuary.

By identifying primary threats and alterations occurring to MBNMS resources, and by monitoring these conditions, future prediction and modeling of events and potential hazards can be more accurately achieved. Effective management strategy calls for vertical integration of information within agencies and organizations, as well as horizontal cooperation and collaboration, such as the RAP, between research groups

and agencies. In this way, sound scientific decisions can be implemented that will contribute to the continued viability and vitality of the MBNMS.

12. *Institution*: Monterey Marine Resources Laboratory (Monterey)

*Sponsor*: CDFG

The CDFG has conducted marine research and management activities in the Monterey Bay area since the 1930s. The mission of the Monterey Marine Resources Laboratory (MMRL) is to document and manage living marine resources and their habitats for their ecological value and for their use and enjoyment by the public. Specific functions of the Marine Resources Laboratory include: monitoring and protecting endangered species; aesthetic, educational, scientific, and nondestructive use of living marine resources; pollution prevention and protection of resources; and, allowance for sport and commercial fisheries, including aquaculture.

As the CDFG expands its marine pollution prevention activities, MMRL's teaching and research opportunities will increase, particularly in Monterey, Moss Landing, and Santa Cruz (at LML).

13. *Institution*: Marine Pollution Studies Program (multiple locations)

*Sponsor*: CDFG

The Marine Pollution Studies Program (MPSP) consists of four facilities and laboratories which investigate toxic substances in marine and estuarine waters. MPSP's goal is to provide data concerning the effect of pollution on living marine resources and commercial and sport fisheries. The institution's programs and laboratories include: California State Mussel Watch (Moss Landing Marine Laboratories), the Marine Bioassay Project and the Marine Pollution Laboratory

(Granite Canyon); the Dispersant and Petroleum Hydrocarbon Toxicology lab (UCSC Institute of Marine Sciences); and the Trace Organics Facility (at LML).

The Office of Oil Spill Prevention and Response is under the administration of the CDFG and includes coastal facilities for agency response to oil spills and rescue and rehabilitation stations for wildlife. While the state's largest station is currently located at the Marine Mammal Center at Ft. Cronkite (Horseshoe Bay) in the Golden Gate National Recreation Area, new sites for accommodating floating pens and treatment areas have been proposed for Moss Landing Harbor at an abandoned intake unit near the PG&E power plant dock. A network of volunteer wildlife care facilities, mostly for seabirds is also being developed. These activities are promulgated by the Oil Pollution Act, Oil Spill Prevention and Response Act, and specific plans, such as the Wildlife Rescue and Care Plan and Coastward Area Contingency Plan. Despite the need for such facilities in the event of oil releases, preventative policies, operations, and technologies are the most effective means of protecting wildlife. It is these preventative efforts that should be emphasized and adequately funded (Ames 1995).

14. *Institution*: National Marine Fisheries Service (Santa Cruz-proposed)
*Sponsor*: NOAA

Currently located on 10 acres in Tiburon (Marin County), the NMFS Laboratory is a multipurpose research and operational facility that supports the fisheries stock assessment, marine ecological research and marine habitat conservation responsibilities of the Southwest Fisheries Science Center at La Jolla, California. The Tiburon Laboratory concentrates on groundfish physiology and ecology, groundfish stock assessments, Klamath and Sacramento River salmon, and habitat issues affecting San Francisco Bay and the Gulf of the Farallones islands. The current Tiburon facilities are obsolete and suffer from physical deterioration.

Since mid-1992, NOAA has expressed an interest in relocating the Laboratory to a location along the Monterey Bay shore or a near-shore environment somewhere between Santa Cruz and Pacific Grove. NOAA seeks at least 33,125 square feet of net usable space on a parcel of land approximately 1.2 acres in size. The criteria established by NOAA include proximity to a seawater delivery system; academic institutions with Ph.D.-level graduate programs and research institutions having a marine science orientation; commercial or recreational marine fishing centers; public transportation; moderately priced housing; and airport and vessel port accessibility (U.S. Department of Commerce, NOAA 1992b, 4). A preferred site has been chosen for a planned $15 million facility on property adjacent to the existing Long Marine Laboratory on the west side of the City of Santa Cruz. The project is part of a larger 60-acre development proposal which includes coastal-dependent land uses, public coastal access, a visitor center, 144 rental housing units, and 70 single family homes (Petre 1994).

Private Institutions

15. *Institute*: Monterey Bay Aquarium Research Institute (Pacific Grove/Moss Landing)
*Sponsor*: David Packard Foundation (a non-profit organization)

MBARI is a non-profit research institute in Pacific Grove which performs basic and applied marine research. It was founded by David Packard in 1987 and has since received funding of over $81 million. Because of its direct funding source, MBARI and Monterey Bay Aquarium have no debt and virtually no limit on construction costs. Additional facilities for this institution have been built at Moss Landing and are scheduled for completion in 1996.

Industrial

16. *Institute*: Monterey Bay Aquarium (Monterey)

*Sponsor*: Non-Profit Organization, Private/Corporate Donors

The Monterey Bay Aquarium is operated by a non-profit foundation, and not only displays some of the best marine aquarium facilities in the world but also conducts a variety of research through its Research Division. Research is primarily focused on the natural near-shore habitats of Monterey Bay, especially the kelp forest communities used by sea otters. A new $57 million wing of the Monterey Bay Aquarium will boost exhibit space by 50 percent. While groundbreaking took place in 1992, the opening of the display tank and exhibit is still months away. The non-profit aquarium has a staff of 350 people and an annual budget of $33 million. The Monterey Bay Aquarium Research Institute is a related organization that will be moving its Pacific Grove offices and laboratories to Moss Landing over the next year, potentially creating space for other coastal-dependent uses. As of 1992, the Aquarium was planning to build a reverse osmosis desalination unit on site to provide water for its toilets. The unit would produce a maximum of 43,000 gallons per day. This proposed facility would directly support the Aquarium, hence it is considered a coastal-related land use in this instance.

17. *Institute*: Pacific Gas & Electric Company (Moss Landing)

*Sponsor*: Public Utility Customers

As part of its oil-fired and steam turbine electricity production, the Moss Landing power plant takes in seawater for cooling and uses the steam to generate power via turbines. The plant discharges cooling water at an elevated temperature. Several intake and outfall pipes are available. Some pipes are not utilized and can be considered for alternative uses by other coastal-dependent operations. MBARI has expressed an interest in use of an intake line for pumping seawater to its new facility on the "island"

at Moss Landing (Phoebus 1995). A Wildlife Rescue and Care Facility could place mammal holding pens along one outfall pier in the event of a major oil spill (Ames 1995).

18. *Institute*: Pacific Mariculture (Davenport)

*Sponsor*: Private, For-profit Business

This five-acre mariculture facility has operated since 1990 on a parcel near Davenport, northwest of Santa Cruz. As is standard for this industry, operations began with a relatively small-scale production while various process and logistical issues were resolved. A pilot facility at Long Marine Lab prior to 1990 enabled this operation to refine its production methods, and the company hopes to increase to 25 acres at the Davenport facility. As with most mariculture, water quality is key to the survival of the operation. Seawater for use in the operation should be low in ammonia, high in phosphate, and devoid of lead. Discharges by municipalities and agricultural runoff can also be detrimental to water quality and, therefore, are major issues when siting mariculture facilities. Because of the general flow pattern of the ocean currents, the north coast of Santa Cruz County has good water quality overall.

19. *Institute*: U.S. Abalone (Santa Cruz)

*Sponsor*: Private, For-profit Business

Situated on approximately three acres adjacent to Long Marine Lab, this mariculture facility may join UCSC and other programs in the proposed expansion onto the Terrace Point property. U.S. Abalone uses seawater pumped by Long Marine Lab's system to operate an abalone farm approximately 1,500 feet from shore.

## Future Expansion and Development Plans

Knowing NOAA's Strategic Plan, and taking into account other uses planned at Ft. Ord, the following facilities with coastal-dependent or coastal-related functions are expected to locate within the MBNMS over the next 10 years:

NOAA Marine Environmental Center (Monterey/Ft. Ord)

A proposed staff of 84 and a predicted budget of $4.7M have been proposed for this facility by NOAA. The programs envisioned and lead agency coordination include:

Hazardous Materials Response Branch, National Ocean Service (NOS)

Damage Assessment Center (NOS)

Restoration Center (NMFS)

Marine Estuarine Management Branch (NOS)

Coastal Ecosystem Modeling and Analysis Division (NMFS)

Center Administration

NOAA Coastal Ecosystem Monitoring and Analysis Division (multiple locations)

A proposed staff of approximately 25 is proposed with a annual budget of up to $1.5M. However, spending reductions by the U.S. Congress may eliminate this program.

NOAA Marine Weather Institute (Monterey)

Establishment of a Marine Weather Institute, in conjunction with the recently relocation of the National Weather Service Weather Forecast Office to Monterey. This applied research institute will provide a focus for practical development of techniques to

forecast marine weather at the mesoscale using Doppler radar and advanced data processing technologies now available to the NWS. This venture is envisioned as a joint effort between the NWS, NOAA's Office of Oceanic and Atmospheric Research, the Naval Postgraduate School, and the Naval Oceanic and Atmospheric Research Laboratory. A staff of 20 individuals is proposed with a budget of approximately $2.0M.

NOAA National Oceanic Data Center (Ft. Ord)

The relocation of this Washington, DC-based facility to Ft. Ord is under consideration due to the direct programmatic relationship that exists between the National Oceanographic Data Center (NODC) and the Navy's oceanographic research and analysis activities. This is the third phase of NOAA's foreseeable future investments into the Monterey Bay area. Current staffing at the Center is at 84 with a $6.8M budget.

NOAA NMFS Laboratory (Santa Cruz)

Under a MOU, the NMFS has joined the USGS Marine Geology Branch as prospective co-tenants on the proposed Terrace Point property in west Santa Cruz. The Tiburon Laboratory would be relocated to the site in 1996. The overall project is part of the UCSC Institute of Marine Science expansion onto property adjacent to the Long Marine Lab facility. Private developers have been coordinating with the University, the City of Santa Cruz, and the CCC to finalize the amount of coastal-dependent versus non-coastal dependent development that will occur on the 60-acre property.

Moss Landing Marine Laboratories (Moss Landing)

The MLML's plan to relocate to Water Tower Hill appears likely to occur. Keeping the facility at a near-shore location improves the laboratory's administration and overall effectiveness by eliminating problems associated with managing an operation located at multiple locations (Oliver 1995). The site requires extensive grading, but is large enough to accommodate the Cal State University laboratories and other coastal-dependent tenants. Approximately five acres will be developed.

Hopkins Marine Station (Monterey)

A new 7,500-square-foot, two-story laboratory and aquarium is about to be constructed on the existing Hopkins Marine Station facility. Little remaining space exists for further development of the property. A parking area and a open scenic corridor between the Monterey Bay Aquarium and the Station's existing facilities may be made available; however, scenic corridors and parking are tightly controlled in this area. An additional 0.4 acres is the maximum available land space in this area.

California State University, Monterey (Ft. Ord)

A new 1,325-acre California State University campus is planning to begin classes at Ft. Ord in Fall 1995. This campus will have a curriculum that could be linked to coastal-dependent laboratories near the shore. It is likely that some collaborative relationship with Moss Landing Marine Labs and/or the Monterey Bay Aquarium Research Institute will emerge as part of the development of an undergraduate program in natural sciences (Hendrickson 1995). No "wet" labs are currently planned for the Ft. Ord campus, and off-site laboratories and facility requirements near the shore have not yet been defined.

# IV. LOCAL COASTAL PLANS

## Consideration of Coastal-Dependent and Coastal-Related Land Use

The following chapter outlines local jurisdictional policies that are either currently proposed or existing within the project area. These documents have been evaluated specifically for their coastal-dependent and/or coastal-related land use policies. The sections are divided by county, and again by their respective municipal LCPs.

County of Santa Cruz

Santa Cruz County Supervisors adopted the draft 1994 General Plan and LCP update in May of 1994. The documents were then certified by the CCC in December 1994. The General Plan is a set of policies and programs to guide future growth and development in a manner consistent with the goals and quality of life desired by Santa Cruz County citizens. Policies within the General Plan become the basis for all decisions related to the use of land and future expansion of the community.

Santa Cruz County's first comprehensive General Plan was prepared in the late 1950s and originally adopted in 1961. During the 1960s, the County adopted several additional area plans which later were updated and replaced in the 1970s by a series of Area General Plans, specifically designating planning areas within Bonny Doon, San Lorenzo Valley, Live Oak, Soquel, Aptos, La Selva, Pajaro Beach, and Pajaro Valley. A county-wide Parks, Recreation, and Open Space Plan was added in 1973, which subsequently became

individual elements to the General Plan. Other functional elements were added beginning in 1969 for housing, seismic safety, fire safety, noise, and scenic highways.

By 1972, coastal development and, in some instances, destruction of coastal resources had greatly decreased the opportunity for public access to the shore. Recognizing these trends, California voters passed Proposition 20, which led to the California Coastal Act of 1976, followed by the adoption of the County's LCP in 1981. Also of interest is the adoption of several land use ordinances between 1977 and 1986.

Under the provisions of the Coastal Act, authority vested in the CCC is to be transferred to the local governments. In 1980, the Santa Cruz County Local Coastal Plan was published as a separate volume to the General Plan. By 1994, this document was incorporated into the General Plan. Within the County's LCP, under Land Use Policies for Specific Areas, the coastal zone is identified as one of those well defined areas with unique characteristics which have additional special land use policies and regulations. LCP Objective 2.22, Coastal Dependent Development states that the County will "ensure priority for coastal-dependent and coastal-related development over other development on the coast (County of Santa Cruz 1994, 2-46)." The overall priority of uses within the Coastal Zone is as follows:

| | |
|---|---|
| First Priority: | Agriculture and coastal-dependent industry; |
| Second Priority: | Recreation, including public parks; visitor-serving commercial uses; and coastal recreation facilities; |
| Third Priority: | Private residential, general industrial, and general commercial uses. |

The policy provisions in Objective 2.22 also include "Maintaining Priority Uses," which would "prohibit the conversion of any existing priority use to another use, except for another use of equal or higher priority." This policy, as it applies to coastal-dependent "industry," is only marginally consistent with the Coastal Act. It is interesting to note the

means available for designating priority sites under LCP Objective 2.23, "Conservation of Coastal Land Resources." Under Objective 2.23, a list of sites reserved for coastal priority was prepared "to ensure the orderly, balanced utilization and conservation of Coastal Zone resources, taking into account the social and economic needs of the people of Santa Cruz County." A similar list may be warranted for preferred or optimal sites which could accommodate new or expanded categories of coastal-dependent activities (e.g., industrial, education, and research).

Aquaculture land use in Santa Cruz County is recognized within the General Plan under LCP Objective 5.15, "Specialized Agricultural Uses." Under this objective, new or expanded aquaculture operations must obtain a coastal development permit with the review of the California Department of Fish and Game. Such plans must also utilize the state environmental review process. Aquaculture operations that are sited on the coast must, in fact, be coastal-dependent, per the Coastal Act definition. In addition, any aquaculture development plan must (1) limit adverse impacts on designated sensitive habitats, (2) provide lateral beach access, (3) provide for public safety when located adjacent to recreational or public use areas, (4) bury intake/outfall lines, and (5) post a bond adequate for recovery of damaged public shorelines and beaches (County of Santa Cruz 1994, 5-55). As part of LCP Objective 5.4.12, "Disturbances of Coastal Waters, Wetlands, Estuaries and Lakes," use of these resources is limited to public services, restoration and protection projects, and aquaculture, or "similar resource-dependent activities."

Mariculture is highly dependent on suitable water quality. The County recognizes the need to protect the water quality of Monterey Bay and other Santa Cruz County coastal waters. As part of this goal, its LCP Objectives include the protection of adjacent MBNMS waters from adverse impacts.

To improve its planning capabilities, the County of Santa Cruz Planning Department has instituted an EMIS (Environmental Management Information System) that is used in

conjunction with various other previously existing reference maps. The EMIS has been utilized especially for this study to provide a broad depiction of siting opportunities within the Santa Cruz County portion of the study area. (See Chapter V.)

City of Santa Cruz

The City of Santa Cruz has prepared a LCP and a associated Coastal Implementation Plan, which has not been formally adopted by the CCC. The latest draft of the LCP has been written as a chapter of the City's General Plan; it is titled *General Plan and Local Coastal Program 1990-2005*. Within this chapter, the City has determined where and to what extent various land uses and coastal activities are considered appropriate. In accordance with the basic goals of the Coastal Act, the City's draft LCP strives to "give priority to coastal-dependent development over other development on the coast." The City loosely defines coastal-dependent uses as "uses of land and water that by their very nature require coastal sites," among other goals related to resource protection and coastal access (City of Santa Cruz 1992, 555).

On page 557 the LCP describes with some detail its focus on the protection of marine resources, including encouragement of "the development of marine research and educational facilities and programs, where appropriate." Likewise, policies regarding water quality, coastal habitats, prime agriculture land and grazing areas, visual resources, coastal access, recreation, and other coastal concerns are expressed. This includes a subsection on "Orderly and Balanced Development," prepared in the wake of controversial development proposals considered for Terrace Point lands adjacent to Long Marine Lab. The City's proposed LCP focuses on the "type, pattern, intensity, location and phasing of new development, the expansion of new and protection of existing coastal-dependent land uses, and the provision of adequate community service and facilities in conjunction with development" (City of Santa Cruz 1992, 558). Each policy considers environmental

constraints, appropriate parcel size, public service capacities, and land use categories, among other goals.

The Coastal Permit Process and Implementation Plan and the Implementation Matrix define those situations under which appeals to the CCC are allowed. For example, projects within 300 ft of the beach's mean high-tide line, coastal bluff, or the nearest public road may be appealed to the CCC. These are also the areas where most coastal-dependent activities occur. For projects landward of this defined area, only major public works or energy projects may be appealed. For land below the mean high-tide line or where the public trust may exist (e.g., the yacht harbor), the CCC may exercise full authority on all applications. Hence, for virtually all coastal-dependent land use projects within the City of Santa Cruz, the CCC may become involved in the review of permit applications.

The City of Santa Cruz has an array of programs and property assessment alternatives which encourage specific properties to be used in preferred ways. Obviously, zoning is the basic level of planning for growth within the community. Under the City's development review process, direct influence can be exerted to control the rate, amount, type, and character of development to be allowed. Incentive programs, typically via economic means or permit structuring represent another avenue for shaping particular planning objectives. Under a "Preferential Assessment," landowners are provided incentives for keeping their land in agricultural or open-space use. Each of these mechanisms enables the City to accommodate coastal-dependent land uses which require special conditions in order to maximize their usefulness to the community, or to fulfill roles in which they have greater-than-local importance.

Other than the specific designation of the Westside Lands (including Terrace Point) for coastal-dependent land use, there are no instances in which a proactive contribution to accommodate coastal dependent research and education has been explicitly expressed by the City. While it is acknowledged that few coastal properties within Santa Cruz are preferred

for such uses, a study of potential sites which would accommodate them may be beneficial. Typical examples of potential uses are aquaculture operations, water quality monitoring and research operations, or coastal-related enterprises that support these potential coastal-dependent land uses. The City has designated only the Westside Lands for coastal-dependent uses, while many of the City's remaining coastal properties have been already prioritized for recreational or tourist-oriented uses.

City of Capitola

The City of Capitola LCP has been incorporated into the City's General Plan and adopted by the CCC. No discussion of existing or proposed coastal-dependent or coastal-related land use designations are in the document. The coastal area in Capitola generally allows for tourist, or "visitor-serving," land use and for residential housing; however, coastal-related uses that support educational and public information goals of the Sanctuary or its resources would be compatible with several existing land uses (Barbaro 1995). Opportunities for applied research or program management activities do not clearly present themselves, based on the LCP's zoning and environmental hazard designations (e.g., bluffs, cultural resources, etc.).

County of Monterey

In accordance with the California Coastal Act of 1976, Monterey County has prepared LCPs for separate segments or regions. Each plan, as required under the Act, establishes land use priorities within the coastal zone. The compilation of materials for the LCPs in Monterey County has been prepared in three distinct phases. Phase I is the identification of coastal planning issues, defined as potential conflict between Coastal Act policies and existing conditions, plans, and proposed uses, and the preparation of a Work Plan to resolve these issues. Phase II is the preparation, adoption, and certification of the Coastal

Land Use Plan. Phase III is the preparation, adoption, and certification of Implementing Actions, such as ordinances, zoning maps, and other programs, required to carry out the Land Use Plan.

To better reflect the varied land character contained within the coastal zone, four separate segments were established within this one jurisdiction. Separate LCPs were drafted for each land segment by County staff as part of Phase II indicated above. The four planning areas are reviewed below beginning from the northern-most land segment to southern-most. These planning areas are North County, Carmel, Big Sur, and Del Monte Forest. The City of Monterey LCP lies between the North County and Carmel coastal planning areas. Phase III, Monterey County's Coastal Implementation Plan, was published in six parts: Part 1 is a county-wide Coastal Implementation Plan for permits and exemptions within the coastal zone, Parts 2 through 5 are for each of the County's four LUP planning areas, and Part 6 is for appendices and county ordinances. The Monterey County General Plan, prepared in 1968, is updated separately from these various coastal land use and implementation plans.

Part 1 of the Coastal Implementation Plan was adopted by the Board of Supervisors, after adoption by the CCC, in January 1988. It sets Coastal Development Permit procedures and zoning district regulations within the coastal zone. It contains allowable or consistent land uses and building constraints (e.g., heights, setbacks, allowable area, etc.). Mention of allowable coastal dependent land uses is made in Chapter 20.130, "Regulations for Light Industrial or Districts in the Coastal Zone," and restricts allowable uses to those "oriented to the support of the fishing industries." These uses include boat building, storage, and repair; marine supply stores; housing and cafes which are intended to serve commercial fishing industry; canneries and processing; aquaculture operations; laboratories; and offices; coastal-related storage facilities; and existing junk yards (County of Monterey 1988, CZ/A-38). Under Chapter 20.138, "Regulations for Public/Quasi-Public Districts

in the Coastal Zone," uses operated under the purview of a public agency, such as harbor facilities, educational and research facilities, cemeteries, and parking lots are allowable "Principal Uses." The relationship of any of these facilities to coastal-dependent or coastal-related priorities is not mentioned in the document (and perhaps it should be). It is under the more restrictive "Conditional Uses" category that "allowable" coastal-dependent development is mentioned and only those uses on federal lands (County of Monterey 1988, CZ/A-48).

North Monterey County Land Use Plan. The North County segment of the Monterey County LUP includes the unincorporated area of the coastal zone from the northern-most city limits of the City of Marina to the Santa Cruz County boundary at the Pajaro River. Phase I, identifying coastal planning issues, was completed for North County and adopted by the County in June 1978, and approved by the CCC in April 1979. Phase II, the North County Coastal Land Use Plan was originally certified in June 1982 and amended in May 1987. The LCP has since been updated and was adopted by the Board of Supervisors in June 1993 and includes updated background and policies on coastal-dependent industries located within the region.

Numerous background reports were used to produce the policies contained in the North County Land Use Plan. In 1982, a Resource Map Book was also adopted as a technical appendix to the Plan, although maps contained in the book may have been prepared using incomplete or outdated data, so site-specific field verification is still required. The Resource Map Book is a compilation of natural resources located within the North County coastal zone and lists various hazards and constraints to development and other mapped information (e.g., planning districts, jurisdictional boundaries). Maps in the book are drawn at the 2,000-ft scale.

The North County contains a vast coastal watershed which includes the Elkhorn Slough National Estuarine Research Reserve and the Moss Landing Wildlife Area. Agencies and

conservation trusts have been able to purchase large portions of wetlands and upland habitat areas in Elkhorn Slough for preservation. Other estuarine areas include Bennett Slough, McClusky Slough, Moro Cojo Slough, and the Old Salinas River Channel. The Pajaro and the Salinas Rivers and runoff from adjacent areas flow through the North County coastal zone and into the Monterey Bay (County of Monterey 1993, 77). The majority of land in North County is in open space, agriculture, or low-density rural residential use. The overall character of the North County coastal zone is rural, with extensive areas left fallow, uncultivated, or undeveloped.

Agriculture is the main economic activity in the area. Recreational land uses in the coastal zone are concentrated in the vicinity of Moss Landing and along the sandy coastline. A coordinated management program for these, and other natural resources, has been undertaken by the California Departments of State Parks and Recreation, the U.S. Fish and Wildlife Service, the County Parks Department, and the Moss Landing Harbor District. Low-density residential land use exists throughout the North County segment. Few moderate- or high-density residential areas exist outside of Moss Landing and the Monterey Dunes Colony. Commercial and industrial uses are concentrated in Moss Landing. Many of the area's industries are coastal-dependent or coastal-related. Local Industries include fish processors, boat builders, PG&E's power plant and tank farm, and National Refractories magnesia and refractory brick factory. Aquaculture and mariculture, which enjoys a particularly high growth potential in this area due to the proximity of estuaries and intensive water quality programs, are also expanding.

The North County LCP identifies an area adjacent to Highway 1, north of Marina, as a potential expansion area specifically for agricultural and/or coastal-related industries. The use of the term coastal-dependent land use is conspicuously absent for this property; however, one may assume coastal-dependent uses may be included since coastal-related land uses must support coastal-dependent land uses.

Based upon the land use priorities established in the Coastal Act, the North County Coastal Land Use Plan clearly articulates the priority of land uses to be established within its coastal zone. The highest priority is placed on the preservation and protection of natural resources, particularly environmentally sensitive habitat areas. Next, agricultural lands considered to be prime farmland are to be kept in production to the maximum extent possible. Coastal-dependent land use follows, with priority over non-agricultural lands, then recreation. The last priority is general commercial, industrial, and residential uses.

The 1993 LUP contains new, specific references to coastal dependent industry, coastal-dependent operations, marine-related research facilities, and commercial aquaculture and mariculture. Each of these separate references is in recognition of specific activities that have been located within the region for many years. Coastal-dependent "industry" refers to the PG&E power plant and the National Refractories plant at Moss Landing. Coastal-dependent "operations" is used when discussing aquaculture. "Marine-related research" facilities refers to MLML and the MBARI facility at Moss Landing. Commercial aquaculture in the region use Elkhorn Slough, a mix of fresh water and ocean water, for fish and shellfish propagation or for underwater pens. Mariculture includes the rearing of ocean resources using ocean water exclusively. In general, the Plan calls for such uses to first expand within existing properties or adjacent locales.

The LUP also contains the Moss Landing Community Plan. This specific area plan contains a chapter titled "Coastal Dependent Industry," featuring subsections on Light Industry and Heavy Industry. The "Agriculture" chapter on discusses aquaculture land uses and refers a new aquaculture overlay map for the region. Within the chapter on "Public/Quasi-Public," marine-related research (including education/scientific) facilities are discussed. The coastal-dependent designation for these facilities, and their associated priority promulgated under the Coastal Act, are conspicuously absent in this chapter.

In the chapter on "Light Industry," support for the economic viability of the commercial fishing industry is clearly expressed (County of Monterey 1993, 103). At the same time, it is stated that most facility modernization for the commercial fishing industry and for marine-related research can all be accommodated on-site. Specifically, the land space formerly held by the MLML is considered to be adequate to meet the future needs of these land uses. However, considering the small size of this parcel, its location within a liquefaction hazard zone, and the lack of available State Parks land adjacent to this property, this reviewer considers this finding dubious and in need of additional analysis. What should be weighed more heavily is the relationship between marine research and sustaining viable commercial fishing within the Monterey Bay region. Support which is "directed at sustaining and improving the commercial fishing industry" is incorporated into the very nature of studies performed at facilities such as the MBARI. Further, recognition of this symbiotic relationship will encourage more mutual accommodation of usable land space, and, in turn, more accurately reflect the potential for mutual siting opportunities in the Moss Landing Community Plan.

It is interesting to consider the evolution of coastal-dependent land use priorities occurring in the North County area between 1987 to 1993. Those topics revised and updated most are as follows:

- the replacement of coastal-dependent commercial uses with "recreation, visitor-serving, and general commercial development" as recommended commercial centers at Moss Landing;
- the encouragement of mariculture, along with commercial aquaculture, to operate in certain non-sensitive wetland areas;
- the addition of light industry, agricultural industry, heavy industry land use categories in which coastal-dependent operations or industries are implied;

- general reference to marine-related research, and specific mention of MLML and MBARI in the same context as commercial fishing (heretofore, the lone coastal-dependent, non-heavy industrial activity accommodated in this area).

Surprisingly little, if any, mention is made of critical coastal-related activities, such as canning, processing fish products, boat repair, and equipment supplies, other than to say that upgrading these facilities is encouraged (County of Monterey 1993, 103). Hence, priority for these coastal-related land uses is not explicit within the Plan.

Del Monte Forest Area Land Use Plan. The Del Monte Forest Area Land Use Plan (LUP) also includes standard program sections designed to support planning staff in the interpretation of planning and zoning policies. The LUP includes an introduction followed by a resource management element, land use and development element, land use support element, public access, implementation and administration element, and lastly, the Del Monte Forest Open Space Management Plan. As with other LCPs, the Coastal Act assurance of "priority for coastal-dependent and coastal-related development over other development on the coast," is reiterated. The LCP reflects the changes necessary to make the 1977 Del Monte Forest Plan consistent with Coastal Act policies.

Regarding priority for coastal-dependent and coastal-related land use, the document states, parenthetically, that specific means to achieve this goal are not "enumerated." The 1977 plan does, however, provide for a visitor-serving resort hotel complex on the coast in the Spanish Bay planning area. The comparison goes on to discuss improvements in beach access and beach maintenance standards for a coastal strip between Pescadero Point to the Pacific Grove boundary, "thus assuring dual goals of visitor access and protection of the coastal-dependent, environmentally sensitive coastal strand environment." It is unclear to this reviewer what context the term "coastal-dependent . . . environment" is used. It is inferred that this term is attempting to describe the sensitive resources adjacent to the coast

as "coastal-dependent." If true, it is not believed to be consistent with the definition of the term as contained within the Coastal Act.

Within the Land Use and Development Element, the basic goals of the Coastal Act are again stated as the basis to "establish direction for land use planning proposals" in the area. In conjunction with the relationship established above, the primary discussion of coastal-related land uses refers to portions of several golf courses, lodges, and turnouts along 17-Mile Drive. It is argued that because this area is known for its variety of "passive and active coastal-related recreational opportunities," it is necessary that priority be given to these "coastal-related" developments. The Plan goes to suggest that "Other development should be located and planned to minimize conflicts with coastal-related uses in these locations . . . " (County of Monterey 1984, 35). This statement appears to be utilizing the Coastal Act's commitment to providing priority land uses to coastal-dependent and coastal-related land uses. Policies enumerated in the Plan to "Assure Priority of Coastal-Dependent Development" specifically place the Spanish Bay resort and golf facilities and Northern California Golf Association (NCGA) golf course facilities under this category (County of Monterey 1984, 38). One policy resulting from what is considered a "coastal-priority" facility is dedication of available water allotments to "hotel complex, condominiums, and golf facilities . . . " at Spanish Bay (County of Monterey 1984, 90).

While it is true that the unique quality of the seaside golf courses is derived, in part, by its proximity to the ocean, the sport of golf is by no means supportive of other coastal-dependent activities, nor is it required to be located on the coast. Hence, its representation as "coastal-related" is taken from a different and incongruent perspective than that intended by the Coastal Act and ultimately practiced in other coastal plans. Golf courses should be allowed along coastal areas, with special recognition to their traditional, unique, prestigious place within the context of the sport as a whole. However, the land use "priority" for this sporting activity should not be derived from any "coastal-related" designation, but simply

for its unique status as a recreational resource. Under the Coastal Act, recreational land uses enhanced by their presence in coastal environments are also recognized as a land use priority, albeit to lesser extent than for coastal-dependent uses. Nonetheless, this policy should be the one employed for special recognition of golfing within this specific LUP and not under the "guise" of being coastal-related.

The apparent interpretation of certain high-profile recreational endeavors as a coastal-related land use priority has, perhaps, skewed the local area's policy towards accommodating existing or former coastal-resource dependent activities and industries. For example, the replacement of a lower priority land use, residential dwellings, has been allowed on coastal property formerly used by a sand mine reclamation area, a coastal-related land use (County of Monterey 1984, 56). (Sand mining in Monterey County is principally driven by the abundance and availability of coastal sand resources, for which associated reclamation areas provide necessary support.) This action results in an overall deficit in actual land space formerly available to truly coastal-dependent or coastal-related land use activities.

The emphasis on preserving and enhancing coastal access, including visual sight-lines to coastal vistas is congruent with separate priorities contained within the Coastal Act. Opportunities to exercise these aesthetic priorities are so prevalent that, to a large extent, many categories of coastal-dependent land use are not considered appropriate within this LCP's planning segment. Within the Resource Management Element, the Plan does provide for certain "low-intensity scientific, educational, or recreational activities" dependent on a sensitive resource, such as remnant native sand dune habitat (County of Monterey 1984, 19). These would be restricted to small-scale, low-impact uses, such as interpretive trails, non-invasive environmental monitoring equipment, and passive recreational infrastructure.

Carmel Area Land Use Plan. The Carmel Area LCP land use plan was approved by the Monterey County Planning Commission in March 1981, adopted by the County Board of Supervisors in October 1982, and then amended in October 1984. The Coastal Commission certified the document, except for two small areas in the Carmel Highlands, then amended and certified it again in January 1985. The document contains standard sections found in an LCP: introduction, resource management, public service system, land use and development, public access, and administration and implementation. Recognition of Coastal Act goals and policies are summaries, as in all central coast LCPs. The function of the LCP is described as providing local government with full permit authority for developments within the coastal zone, including instances in which appeals to the CCC are possible.

The document is the culmination of several far-reaching land use plans prepared for the Carmel Coastal segment over the preceding 25 years. These plans espoused a number of development policies and land use recommendations aimed at maintaining the unique scenic and recreational resources of this coastal area. The sensitivity of this plan to the natural and scenic environment is based on community and citizen support. Hence, the most common goal for the Carmel area is that future development blend with, and be clearly subordinate to, the natural scenic character. Second to this, but also considered a high priority, is the preservation of environmentally sensitive habitat areas. The LCP concurs with the protections provided for under the Coastal Act and permits only resource-dependent uses, such as nature education and research, hunting, fishing, and aquaculture, in sites that would degrade these sensitive resources (County of Monterey 1984, 14).

Within Monterey County's LCP, educational institutes and research organizations are typically mentioned in sections discussing public and quasi-public services. In Carmel, these include schools, fire protection, a continuing education institute, a sanitary treatment plant, and the Carmelite Monastery, none of which are coastal-dependent or coastal-related.

Nonetheless, Carmel policy relative to such uses suggest that siting options are most appropriately found in areas designated for residential use. A policy which effectively requires coastal-dependent land uses only occur in residential areas is not congruent with the operational requirements for these types of facilities.

In the Plan, research and monitoring activities by cooperating state and county agencies, universities, research stations, and water districts are encouraged to, among other things, assess water quality, evaluate kelp harvesting, prepare annual sea otter population reports, and perform pelagic bird and marine mammal population studies along the Carmel coast (County of Monterey 1984, 23). Facilities or sites to accommodate these activities are not addressed either generally or specifically within the document.

All decisions concerning the development of the Carmel area must ensure the protection of water quality. Growth management in the Carmel area is closely tied to limited water allotments and sewer system/wastewater treatment capacities. To ensure continued functioning of "coastal priority uses," these infrastructure allocations should be reserved to accommodate such uses. Coastal priority uses is not defined specifically; however, known priorities include recreation and visitor-serving land uses (as well as scenic resource preservation). It is unclear whether these growth-limiting factors would preclude the introduction of coastal-dependent land use in any potentially suitable site within the Carmel area, even if given explicit priority over competing land uses under the LCP.

Big Sur Coast Land Use Plan-Local Coastal Program. The Big Sur Coast LUP was prepared by the County of Monterey planning staff, adopted by the Monterey Planning Commission in February 1991, and subsequently adopted by the County of Monterey Board of Supervisors and the CCC in November 1985 and April 1986, respectively. This LUP encompasses the southern portion of the study area included in this research (Pt. Sur) and continues southward to the San Luis Obispo county line. The LUP supersedes the *Monterey County Coast Master Plan* adopted in 1962. Upon adoption of the Coastal Act in

1976, a series of background reports were prepared by the County to recommend policy changes needed to meet the requirements of the Act. The *Monterey County Coastal Implementation Plan*, Part 3, "Regulations for Development" in the Big Sur Coast Land Use Plan, defines "Coastal Dependent Development or Use" as a development or land use which requires a site on or adjacent to the sea in order to be able to function at all. "Coastal-Related Development" is any use or development that is dependent on a coastal dependent development or use (County of Monterey 1986, BS-3). As previously mentioned, these LCP definitions are extracted from the Coastal Act, and were not subsequently altered or reinterpreted when establishing a relationship between the 1962 Master Plan and the requirements of the Coastal Act.

The final LUP adopted by the CCC includes a description of its overall philosophy and goals and a clear set of objectives. The philosophy and goals include retaining (1) the scenic beauty and near-wilderness attributes, (2) the rural character and abundance of natural resources, and (3) the special cultural character as a primary resource (County of Monterey 1986, 6). The basic objectives set by the County for the Big Sur Coast area are congruent with those of the Coastal Act, and include the following components: natural resources, coastal scenic resources, highway 1, land use development, and shoreline access. As they might relate to coastal-dependent or coastal-related land uses, these objectives were written with the intent and spirit of the Coastal Act properly in focus. In no section is an objective, be it coastal-enhanced scenic qualities, recreation, or other uses, given priority by redefining the use as either "coastal-dependent" or "coastal-related."

Coastal-dependent uses are mentioned specifically in the subsection titled "Exceptions to Key Policies" contained in the "Scenic Resources" chapter. It indicates that, provided that environmental constraints and available alternatives are considered, coastal-dependent activities such as on-shore navigational aids needed by the commercial fishing industry are exempt (County of Monterey 1986, 20). While exemption for this particular coastal-

dependent use is narrowly focused, and might allow for certain limited-scale marine monitoring or research activities, it assigns the proper land use to its intended priority hierarchy as defined in the Coastal Act.

City of Monterey

The City of Monterey has prepared a LUP for each of five segments of coast contained within the City. These five land use plans, in conjunction with certified land use controls, constitute the entire LCP proposed for the City of Monterey. Starting from the east, the five coastal segments within the City limits are Del Monte Beach, Monterey Harbor, Cannery Row, Skyline, and Del Monte Forest. The Del Monte Forest Area LUP was prepared by the County of Monterey and is described in the previous chapter.

Del Monte Beach Land Use Plan. The Del Monte Beach area lies between Roberts Lake and the Monterey's harbor district. The Land Use Plan contained within the Del Monte Beach LCP addresses visitor-serving commercial facilities, public support facilities, recreation, visual resources, and traffic. Two potentially available coastal properties are discussed for future development potential, the abandoned water treatment plant and the U.S. Navy parcel. The former water treatment plant property will revert back to the U.S. Navy; however, the City plans to discuss the possibility of public use for this parcel. The adjacent U.S. Navy property contains potentially sensitive beach dune habitat, and has also been identified as a future resource for public use.

As early as 1981, the Navy proposed the construction of an Ocean Sciences building behind the fore dunes near the western end of this bayside property. Sea water pumping and storage, with laboratories, communciations, and weather observation facilities were originally proposed for a coastal-dependent oceanographic education facility (City of Monterey 1992b, 93). Despite the intention of the federal government to consider oceanographic uses of the property, the City is most concerned with developing such areas

for public use and recreation. However, the ability of this parcel to support coastal-dependent land uses should be viewed from a greater-than-local perspective.

Monterey Harbor Land Use Plan. The Monterey Harbor segment of the City of Monterey LCP is located between Cannery Row to the west and Del Monte Beach to the east. The Harbor LCP area includes approximately 115 acres of land fronting on the southern portion of Monterey Bay. The area is comprised principally of Fisherman's Wharf, Wharf #2, an abandoned railroad right-of-way along Del Monte Avenue and Lighthouse Curve, the Monterey State Historic Park area, and the Monterey Beach area, among other properties.

Current zoning for the Harbor LCP area is primarily commercial with some residential. Vacant land is limited to two Urban Renewal Project parcels (1.5 acres), sand beaches, a small sand dune area, and federal land at the foot of the Presidio. The railroad right-of-way between Cannery Row and Fisherman's Wharf has been purchased by the City and the Monterey Peninsula Regional Park District. An additional railroad right-of-way leading up to Seaside is planned for possible use as a transportation corridor.

The Harbor LCP addresses policies associated with the following sections: natural marine resource areas and hazard zones, public and coastal related use and access, and locating and planning new development, along with various policies related to the Wharf Master Plan. The Harbor LCP land use plan was adopted by the Monterey City Council in July 1986. Although certification of this version by the CCC was denied, modifications made in the June 1987 addendum eventually resulted in certification of the document. Additional language was added in August 1987 in response to some of these modifications.

Policies and concerns relative to accommodating coastal-dependent and coastal-related land uses are mentioned in various places within each of the sections mentioned above. While the stated land use priorities established in the Coastal Act are repeated here, there exists a preference by the preparers to emphasize specific types of coastal-dependent and

coastal-related land use. Policies exist which tend to protect or support the existing commercial fishing industry and range from provisions for berthing allocations, to recommending that only commercial uses supporting fishing and boating be allowed, to restricting development at Wharf #2, to commercial fishing-related industries and boating uses located in the marina and harbor.

Under the policies established for the Harbor LCP, priority land use for coastal-dependent industries or activities is provided only if such uses fit within specified criteria. They must, for example, serve the commercial fishing industry and boating uses, maintain the same scale and intensity that currently exists on the Wharf and its buildings, be located near existing uses if new buildings are proposed, and, finally, be subject to an analysis of parking needs and circulation patterns (City of Monterey 1987, 1). Studies evaluating the appropriateness of a range of coastal-dependent and coastal-related opportunities in harbor and wharf environments have been prepared, and have been careful to support all aspects of a harbor's functional value (California Coastal Conservancy 1991, 7).

One property has been explicitly "designated for coastal-dependent or marine commercial uses" and is located on the Southern Pacific "east property." Suggested uses included boat sales and chandleries; snack bar/small restaurant; bait and tackle/sundry shops; marine recreational equipment and supplies, sales, and rentals; fish market; offices for marine-related businesses; and boat storage and rental. These uses more clearly fall under the category of coastal-related, since each does not require direct access to coastal waters. For example, while bait and tackle shops may be best located adjacent to the water's edge, restaurants, shops, supplies, and markets can locate landward from commercial coastside properties and harbors.

Skyline Land Use Plan. The salient portions of the Skyline LUP are its discussion of portions of Scenic Drive and the Presidio. Also of note is the agreement to allow the County of Monterey to prepare the Skyline (and Del Monte Forest) LUP; however, the City

will retain responsibility for the content of the document and for obtaining local approval and CCC certification. The Skyline LUP reflects policies, programs, and land uses contained in both the City's General Plan and the 1977 General Development Plan, including the Scenic Drive area previously annexed to the City. If adopted as an Area Plan, the Skyline LUP will become a portion of the General Plan. The LUP is presented in three sections: (1) policies to protect natural coastal resources, (2) policies to provide for public and coastal-related use and access, and (3) establishment of land use and development policies associated with the first two sections. The LUP deals primarily with assuring "coastal access" to both existing and currently undesignated coastal vistas, views, and view corridors, especially along Scenic Drive. It also attempts to preserve the rights of private land owners by allowing land uses which are congruent with the institutional make-up and environmental constraints of the region and which minimize disturbance of surrounding land areas (City of Monterey 1992a, 1-7).

In general, the LUP lacks a clear policy for prioritizing or accommodating coastal-dependent land uses within the Skyline planning segment. The Plan is somewhat narrowly focused on local natural resource protection, particularly forest management and scenic corridors. While these elements are the basis of the City's unique coastal landscape, broader planning policies and land use goals should be sought. The Plan's treatment of natural coastal resource impacts does not recognize development opportunities other than those which are tourism or recreation related.

Discussion within "Public and Coastal-Related Use and Access" is almost exclusively restricted to maintaining views along the 17 Mile Scenic Drive. Coastal access points are identified and scenic views from varying points along roads and trails are assessed. The term "coastal-related use" is not used in the text; however, the document's emphasis leads one to assume that any such use is restricted to access to coastal viewsheds, roadways, trails, and bike paths, and other near-shore recreational activities.

The "Land Use" chapter contains an analysis of land use constraints and opportunities within the coastal zone planning area. This document notes that federal law excludes the U.S. Army's Presidio in Monterey from the California coastal zone. While under exclusive federal jurisdiction, land use designations at the Presidio are only recommendations and are not binding. However, all direct federal projects must be reviewed for consistency with the Coastal Act. Mention is made in this chapter of established land use priorities contained within the Coastal Act; however, the only land use categories discussed are open space, public-semi-public, residential, and commercial. Specific reference to coastal-dependent or coastal-related land uses are not mentioned within these subsections. A indirect reference is made when discussing Local Coastal Policies related to sensitive habitat areas. As is appropriate, only "a minimum level of facilities essential to the support of resource-dependent recreation, educational, or scientific use of these areas shall be permitted" (City of Monterey 1992a, 4-5).

The LUP essentially functions as a guide to scenic viewsheds within the City of Monterey's picturesque Skyline district. Various sections of the Coastal Act are cited directly, but policies related to coastal-dependent land use priority are not adopted within the LUP's language, and do not appear to be practiced within this section of the coastal zone. Coastal priority uses, according to this document, appear to be solely represented by recreational opportunities and coastal access. Coastal-dependent or coastal-related activities associated with developed or undeveloped shoreline property are not considered, even if restricted to research, education, or more benign activities, such as marine-related environmental monitoring.

Cannery Row LCP Land Use Plan. This segment of the City of Monterey LCP was adopted by the Monterey City Council in February 1980. After regional and state CCC staff comments and associated language amendments by the City, the LCP was adopted by the CCC in November 1981. The findings, policies, and proposed implementation actions

found in the LCP are the result of early land use planning efforts beginning in 1977. During the course of preparing the LCP, portions of the Cannery Row planning area were removed from the coastal zone; however, some of these areas are still addressed by the LCP (City of Monterey 1981, viii).

As with the other four LCP land use plans for the City of Monterey, natural resources and coastal access are described, as are circulation, parking, and recreation. All of these conditions are vital to the economic prosperity of the City of Monterey as well as contributing factors when siting coastal-dependent or coastal-related land uses. Because of the date of this LCP, the Monterey Bay Aquarium is simply referred to as follows: "An aquarium containing non-recreation research and educational activities in addition to recreation activities is proposed in the now vacant Hovden Cannery at the north end of Cannery Row." The LCP policy then states that "shoreline dependent non-recreational uses should be defined to include those that require a waterfront location (e.g., marine safety installations, marine research, aquariums, aquaculture, and marine repair facilities). The coastal dependent, non-recreational uses defined above are to be in proper character with and scale to the Cannery Row area.

The City's 1981 policy establishing priority for coastal dependent, non-recreational uses was very far reaching, but also contained very specific references. As a result of the 1981 policy: (1) the existing Coast Guard facilities, marine repair facility, and proposed aquarium (Monterey Bay Aquarium) were being given coastal-dependent status at their specifically proposed locations, (2) aquaculture and marine research uses were allowed and encouraged as principal permitted uses along the entire shoreline, and (3) food service and retail sales within coastal-dependent uses were allowed as a conditional use. Implementation of this concise and specific policy for coastal dependent marine research has enabled prestigious research, education, and resource protection programs to be based in this community. These programs include the Monterey Bay Aquarium, NOAA's Ocean

Applications Branch of the National Ocean Service, the MBNMS Office, and the CDFG Marine Resources and Marine Pollution Studies Laboratories, among others.

# V. CONSTRAINTS ANALYSIS AND GEOGRAPHIC ANALYSIS

## General Siting Constraints for Coastal-Dependent Land Use

Types of Constraints Evaluated

Three types of constraints to siting coastal-dependent and coastal-related land uses are considered: jurisdictional, environmental, and operational. *Jurisdictional constraints* are those that are established by the local jurisdiction, typically via an adopted city or county LCP and its associated Implementation Plan. *Environmental constraints* are limited to natural resource sensitivities which are considered within impact and feasibility reports prepared under environmental law for most major projects. *Operational constraints* are those inherent in the functional siting criteria generally used by the coastal-dependent and coastal-related land uses discussed here. Each of these constraint categories is described in greater detail below:

Jurisdictional Constraints

Jurisdictional constraints are those reflected by each individual LCP, Land Use Implementation Plan, and General Plan when making specific compatibility and appropriate land use determinations regarding a project. They typically define the existing character of a planning segment and establish whether general categories of land use are to be allowed. Jurisdictional constraints are derived from prior land use patterns in the vicinity as well as from objectives stated in the Coastal Act. It should be understood that constraints related to zoning and land use designations can be changed; however, patterns established in LCPs

prepared within the last five years will tend to dictate the land use patterns of any proposed activities within the jurisdiction. These constraints are significant, since they often entail the preparation of applications, planning documents, and special studies, and the payment of fees. Specific policies may or may not be explicit with respect to coastal-dependent or coastal-related land use, as discussed earlier. However, each jurisdiction has coastal land use preferences that are reflected in their LCPs as either priority or perferred land uses.

Environmental Constraints

In addition to the operational requirements that dictate the areas of potential land use by certain coastal-dependent activities, all siting activities are subject to either the California Environmental Quality Act and/or the National Environmental Policy Act (NEPA). These pieces of legislation require that a major action consider the environmental consequences of the proposed action and viable alternative actions prior to making a commitment of funds or resources. The review of environmentally sensitive areas is necessary for resource preservation and may be a constraint to the selection of coastal sites. While not an exhaustive list, the factors listed in Table 2 are common to coastal environments and have been influential in determining land use patterns for coastal-dependent facilities.

Operational Constraints

A representative list of operational requirements which are typical for most of the coastal-dependent research/education, industrial, and mariculture facilities discussed in this research paper is shown in Table 2. This list has been derived from site selection and environmental impact documentation and from interviews with knowledgeable individuals within the each application. In addition to these coastal-dependent requirements, operational constraints also include the need for utilities and infrastructure, housing and

**Table 2. – Constraints Which Typically Affect Coastal-Dependent and Coastal-Related Land Use Selection**

| Environmental Constraints | Operational Constraints | Jurisdictional Constraints |
|---|---|---|
| Archaeologically Sensitive | Seawater Retrieval | Land Use Compatibility |
| Endangered Flora and Fauna | Ocean Discharge | Zoning Restrictions |
| Sensitive Habitat Areas | Direct Coastal Access | Housing Elements |
| Wetlands | Indirect Coastal Access | Commercial and Industrial Density |
| Geological Hazards | High Seawater Quality | Utility Supply and Access |
| Critical Erosion and Slopes | Adjacent to Piers/Vessels | Community Design |
| Prime Agriculture | Access to Dunes or Estuaries | Public Support Facilities |
| Recreational Resources | Proximity to Marine Community | Coastal Plan Consistency |
| Water Quality Degradation | Access to Local Coastal Resource | Public Safety and Noise |

support facilities, and facility or architectural requirements.

The constraints shown in Table 2 are those which typically affect coastal-dependent and coastal-related land use site selection and acquisition. The list is not meant to be exhaustive for every land use scenario; any individual project's needs may vary from this depiction.

To optimize the potential for utilizing a coastal property for various intensities of scientific research, marine education, or mariculture, these activities were divided into the following three general categories: Basic Research and Education, Applied Research and Management, and Mariculture and Industry. Basic Research and Education includes relatively small or temporary field monitoring sites, remote stations and laboratories, and localized resource studies and projects. Applied Research and Management includes major research institutions and laboratories for research, education, large aquariums and wet labs, mammal holding tanks, and pens. Mariculture and Industry is typically concerned with the production and harvesting of renewable marine resource products in a controlled environment or setting.

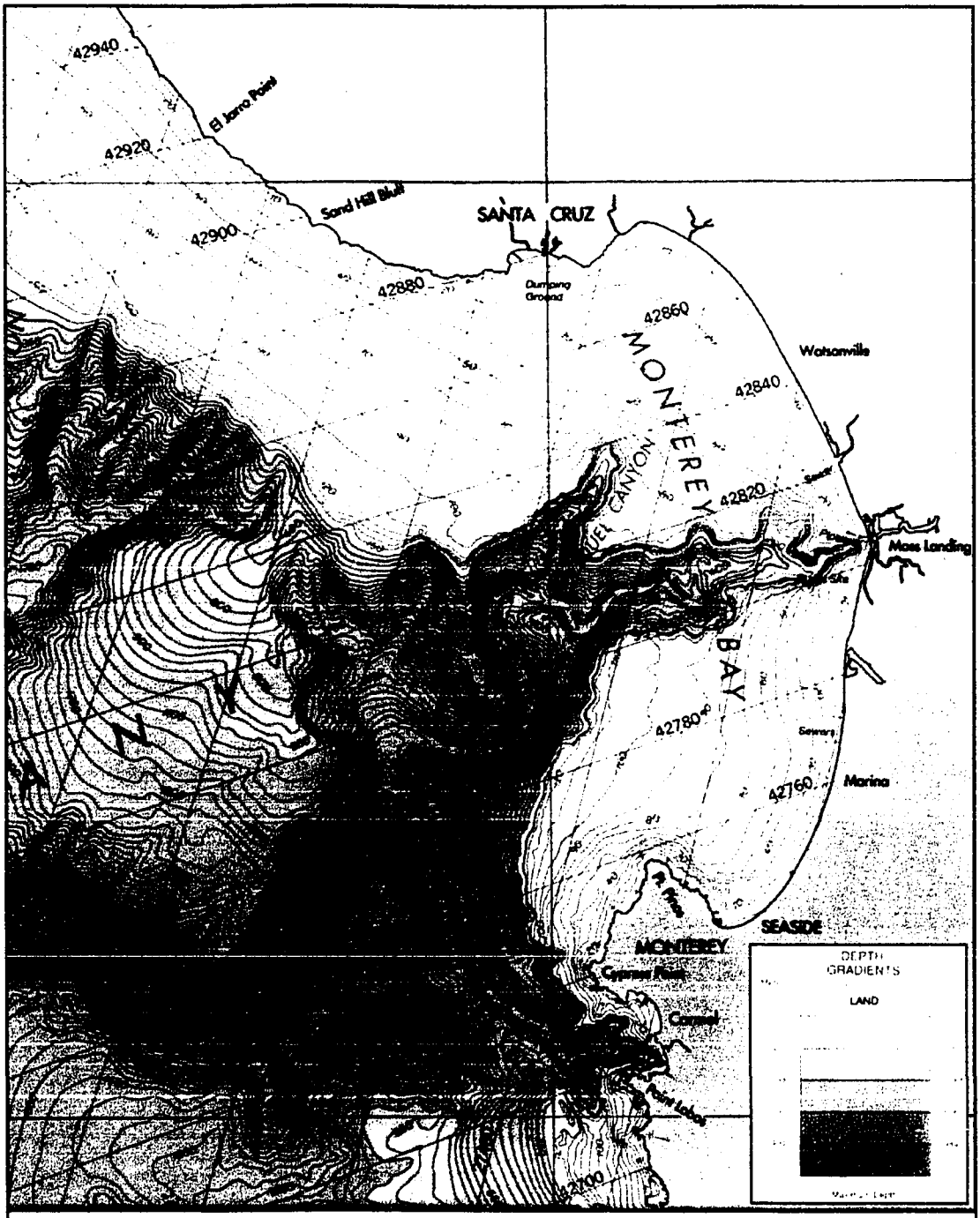
A list of operational constraints which typically influence coastal-dependent and coastal-related land use decisions is shown in Table 3.

## Geographic Analysis

The Monterey Bay area is becoming a center of marine science research and education due to the abundance and variety of unique natural resources and human access to them. A prime example is the Monterey Bay Submarine Canyon (Figure 9). To access this and other marine resources, coastal sites which can accommodate research vessels and laboratories and are proximal to other marine researchers are in demand. Likewise, the mariculture industry has variety of nearshore needs, such as proximity to estuarine or harbor locations. Applied field monitoring operations are far more adaptable to the sensitivity of the immediate environment and have fewer restrictions to siting.

**Table 3. – Specialized Coastal Dependent Land Use Operational Constraints Matrix**
(- = Rarely; +/- = Sometimes; + = Frequently)

| Operational Constraints | Basic Research and Education | Applied Research & Management | Mariculture and Large Industry |
|---|---|---|---|
| Seawater Retrieval | +/- | + | + |
| Ocean Discharge | +/- | +/- | + |
| Direct Coastal Access | + | +/- | +/- |
| Indirect Coastal Access | + | + | + |
| High Seawater Quality | +/- | + | + |
| Adjacent to Piers/Vessels | - | +/- | - |
| Access to Dunes or Estuaries | + | +/- | +/- |
| Proximity to Marine Community | - | + | - |




SOURCE: NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, NATIONAL OCEAN SERVICE COAST AND GEODETIC SURVEY (1992)

FIGURE 9: MONTEREY BAY SUBMARINE CANYON

To assess the area's ability to accommodate various categories of coastal-dependent land uses, a geographical analysis was performed. Detailed analysis was performed for eighteen geographical segments using publicly available documents, maps, and aerial photographs, and by conducting site visits. Each segment corresponds to previously established boundaries contained within city and county LCPs that have coastal properties within the study area. Each segment was analyzed for their jurisdictional, environmental, and operational constraints. Data and information concerning these constraints were mapped using the Environmental Mapping Information System (EMIS) for Santa Cruz County, and from published maps prepared by graphic specialists at the County of Monterey Planning Department (Conley 1995; Early 1995), and are depicted geographically on Figures 10 through 15.

Jurisdictional conditions which have a major effect on siting coastal-dependent land uses are specifically mapped for the portion of project area within Santa Cruz County. Jurisdictional constraints were judged based on existing land use designations within each segment, and a careful review of applicable LCP documents. Industrial, commercial, parks and recreation, agriculture, government and institutional, and undeveloped lands were mapped from a myriad of available attributes and prepared for the Santa Cruz County coast. The appropriate land use policies for each of these mapped areas were then used in the analysis. The segments analyzed in Santa Cruz County for jurisdictional constraints are represented in Figures 16 through 19.

Environmental constraints that affect siting were also prepared. For Santa Cruz County, environmental constraints that could be graphically displayed and analyzed included areas having biotic resources, state and county seismic fault zones, a 100-year floodplain designation, and the least disturbed watersheds. Environmental constraints associated with steep slopes, bluffs, and cliffs were established via on-site observations

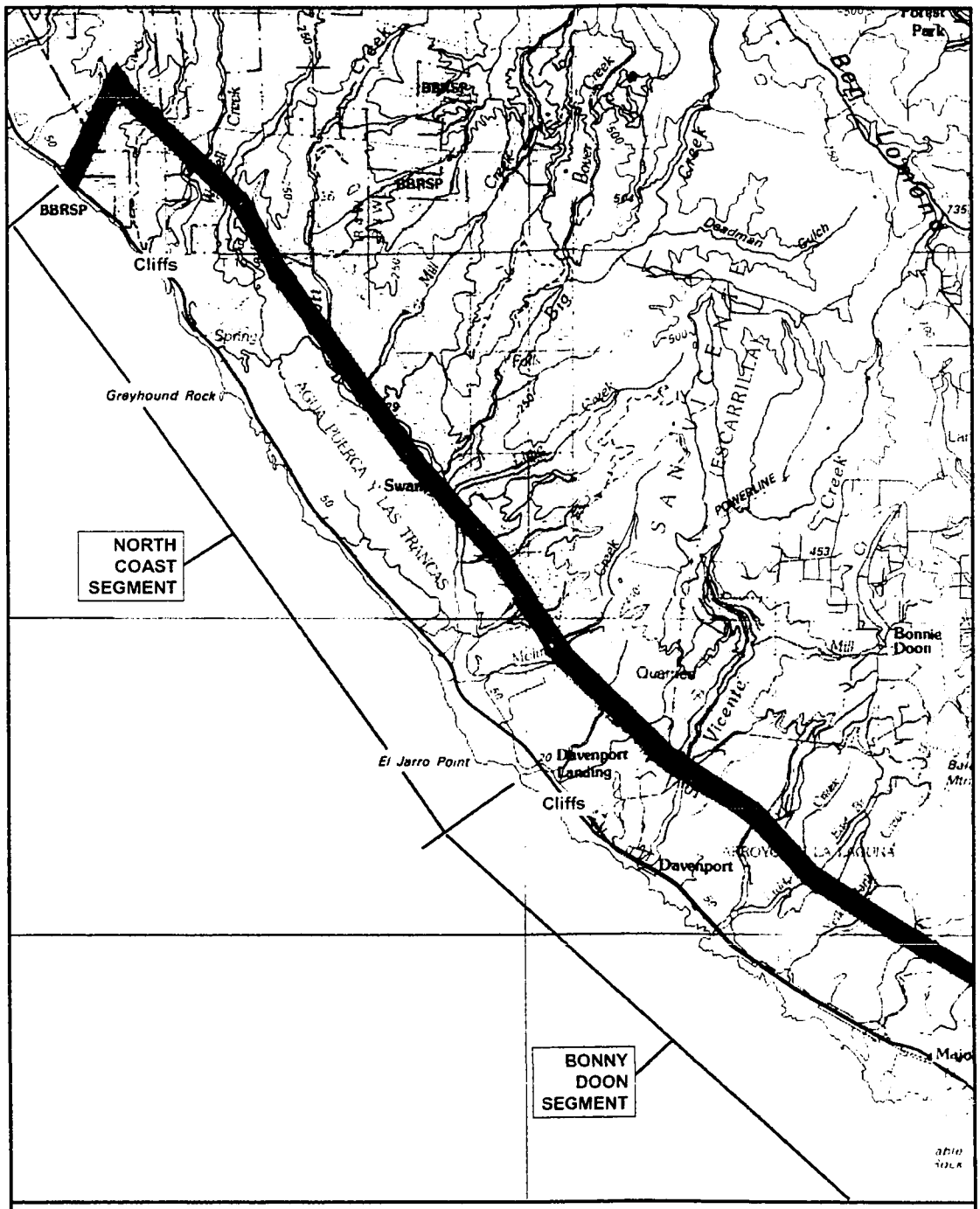
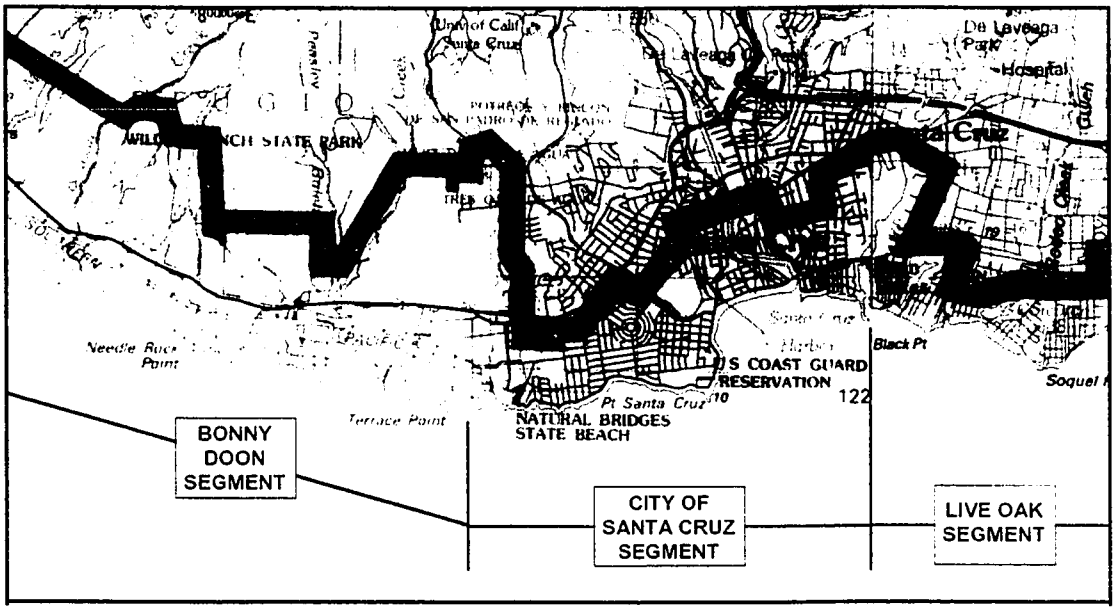



FIGURE 10: CONSTRAINTS ANALYSIS SEGMENTS



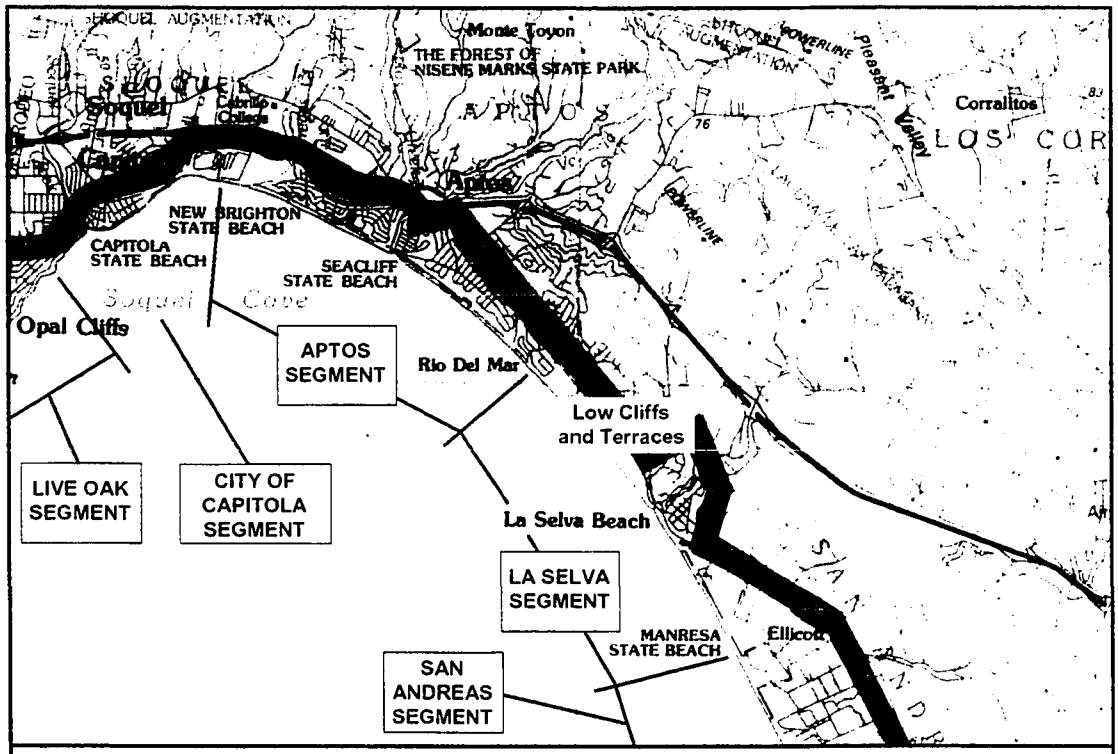




FIGURE 11: CONSTRAINTS ANALYSIS SEGMENTS

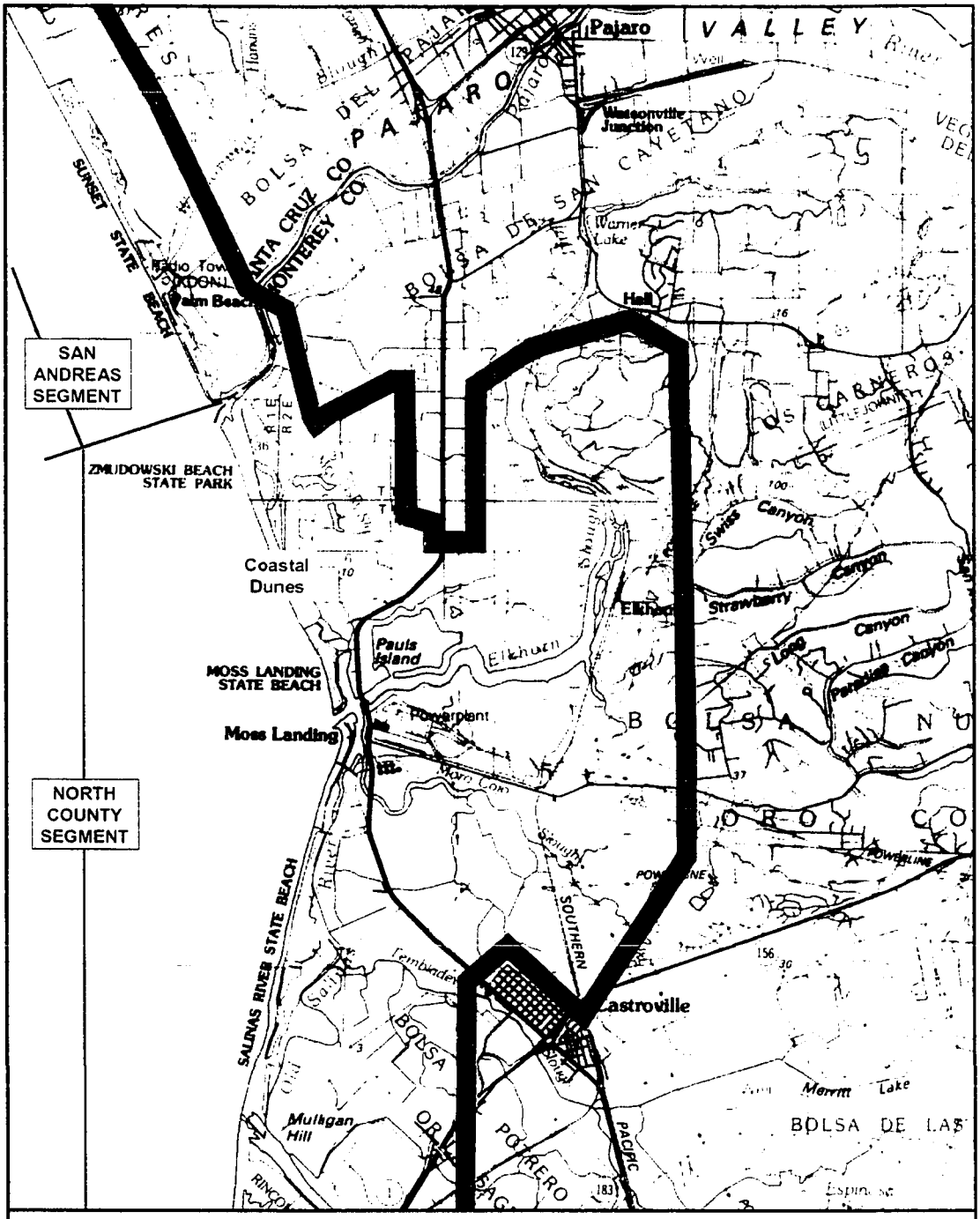



FIGURE 12: CONSTRAINTS ANALYSIS SEGMENTS

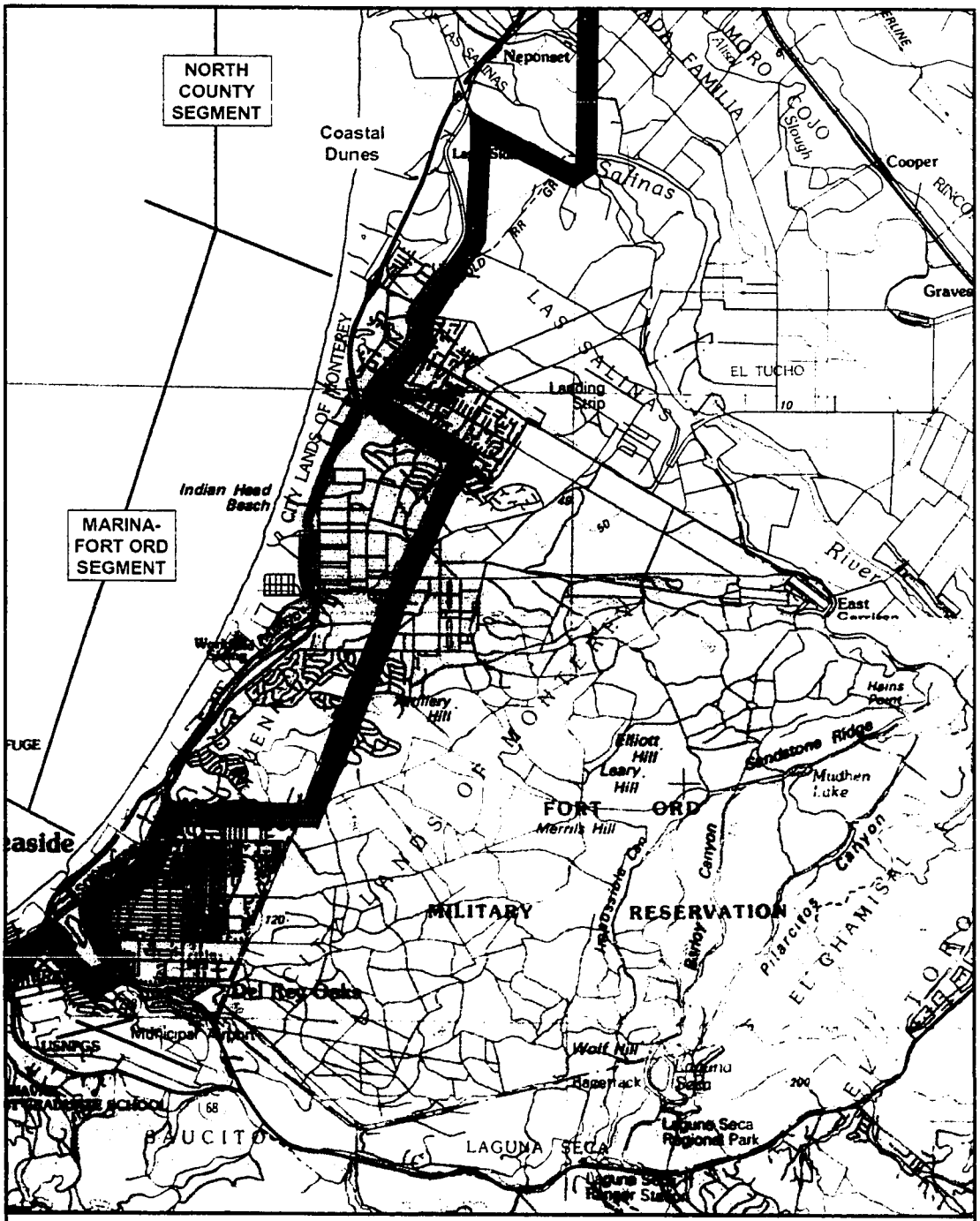



FIGURE 13: CONSTRAINTS ANALYSIS SEGMENTS

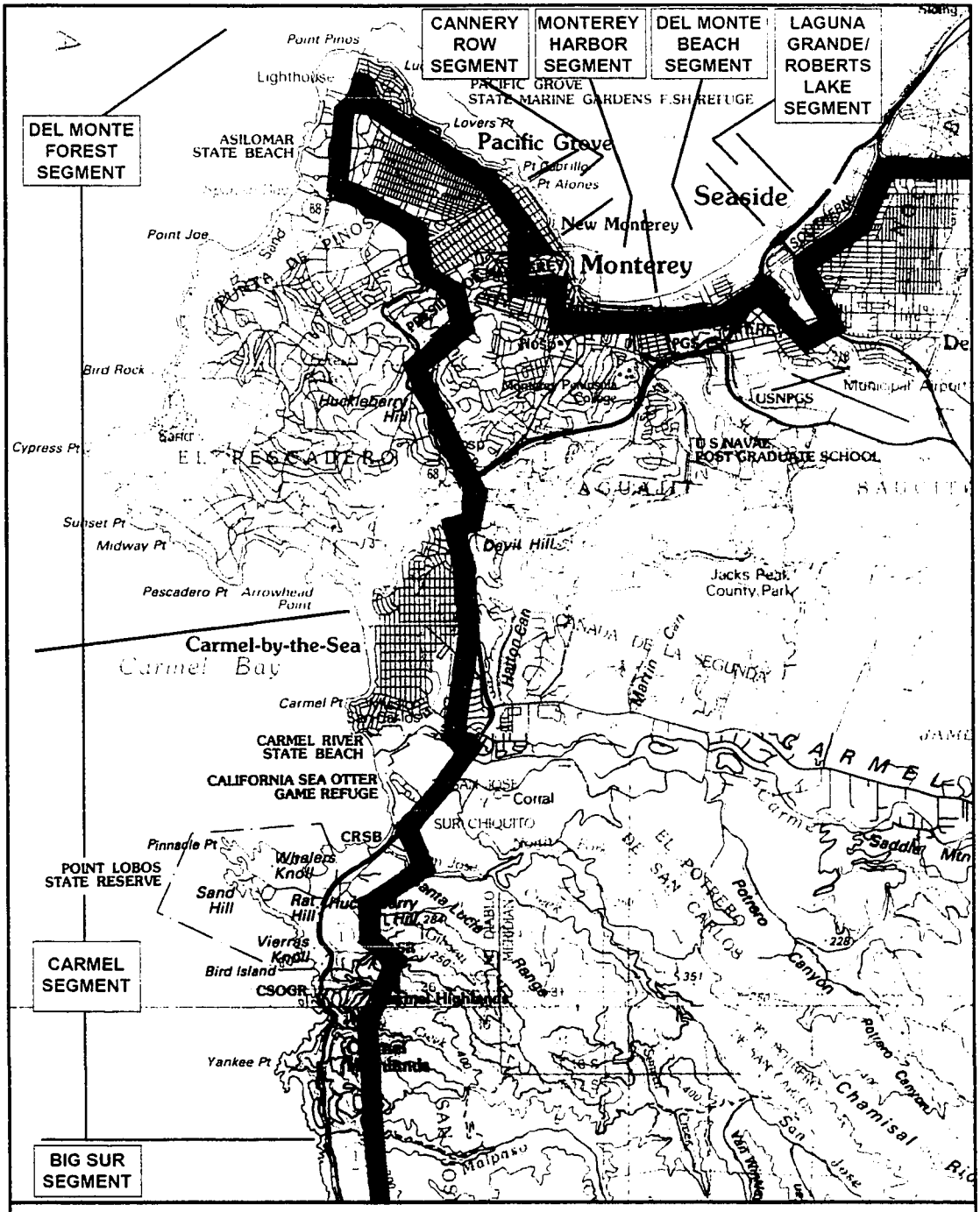



FIGURE 14: CONSTRAINTS ANALYSIS SEGMENTS

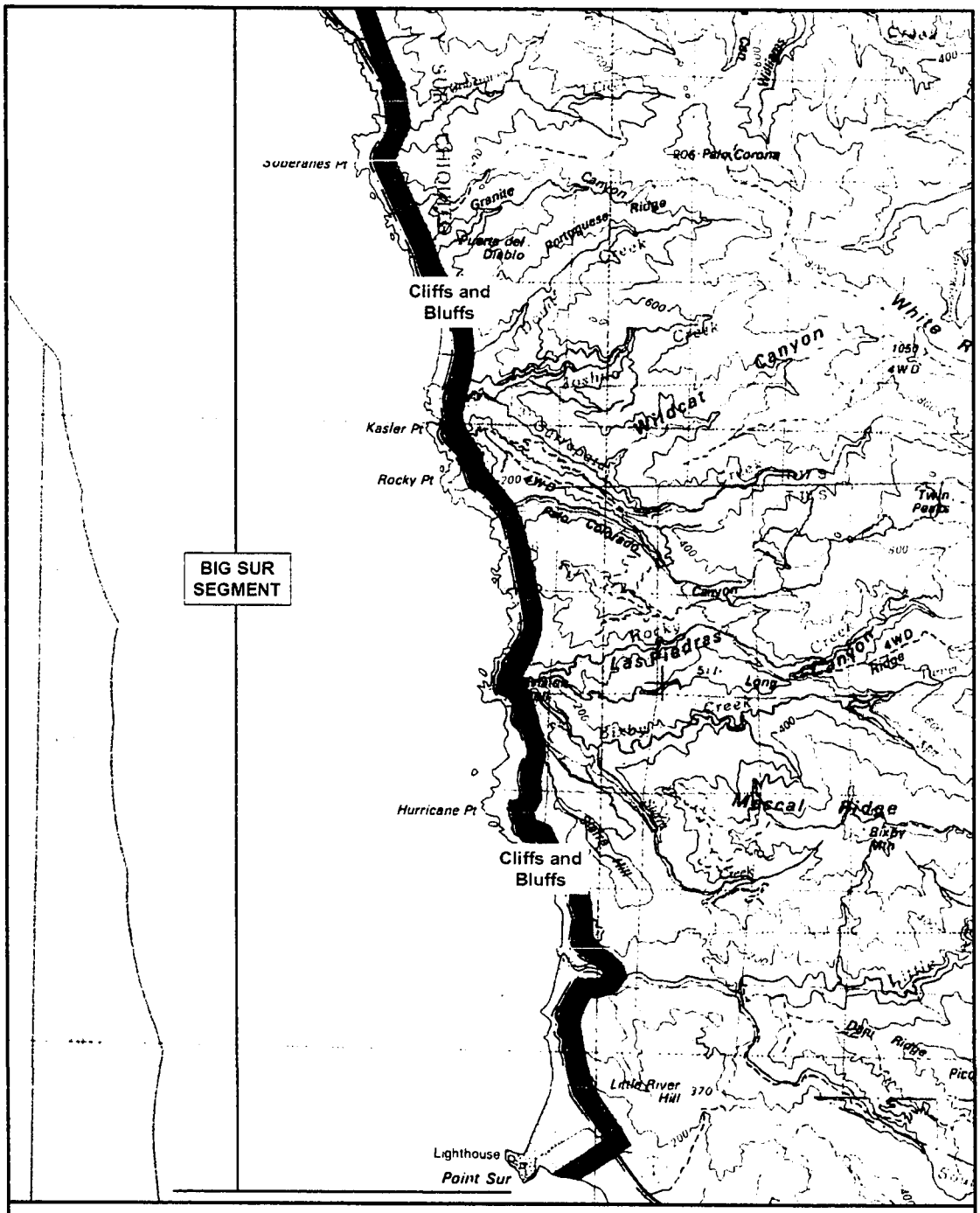
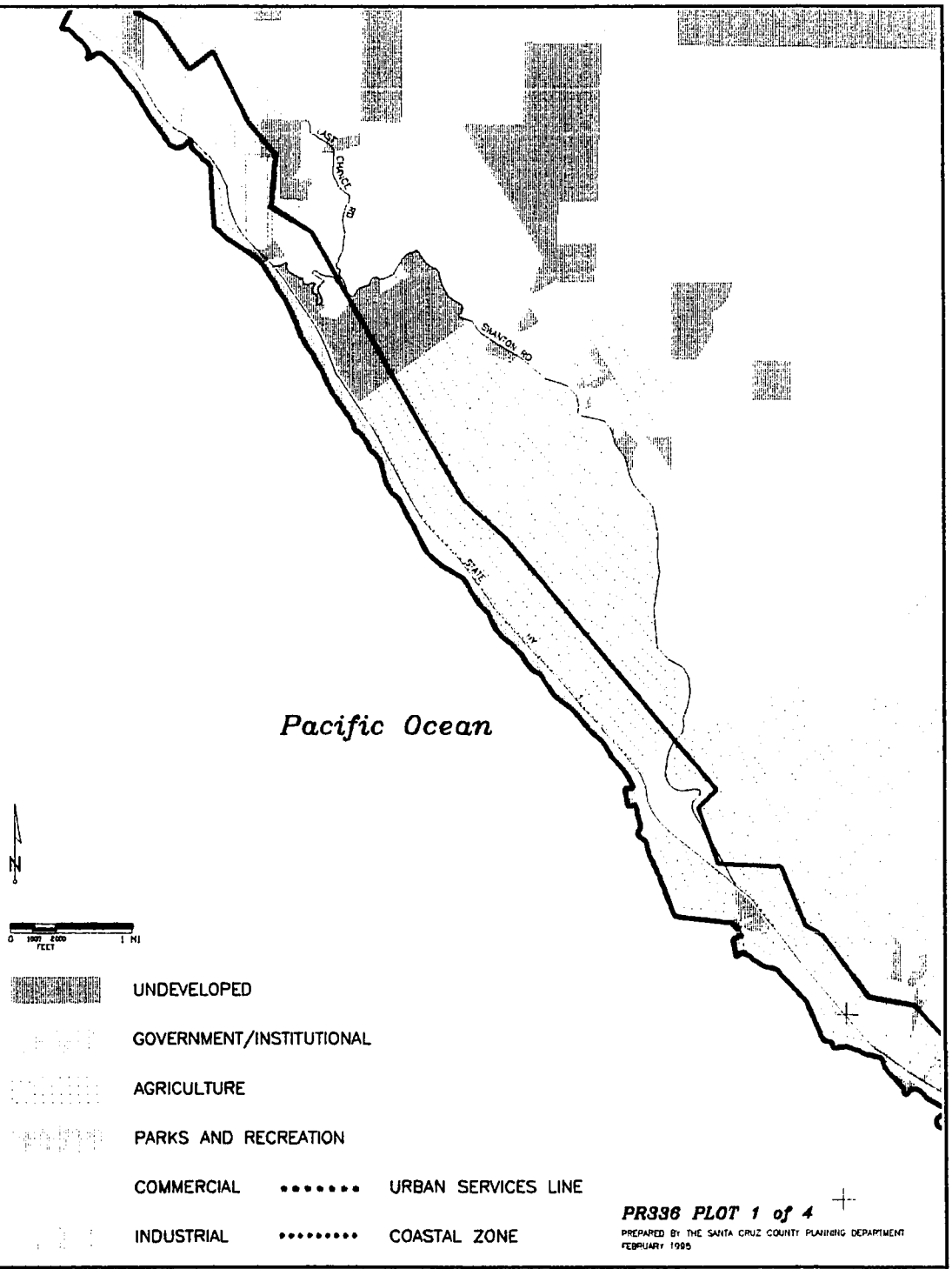
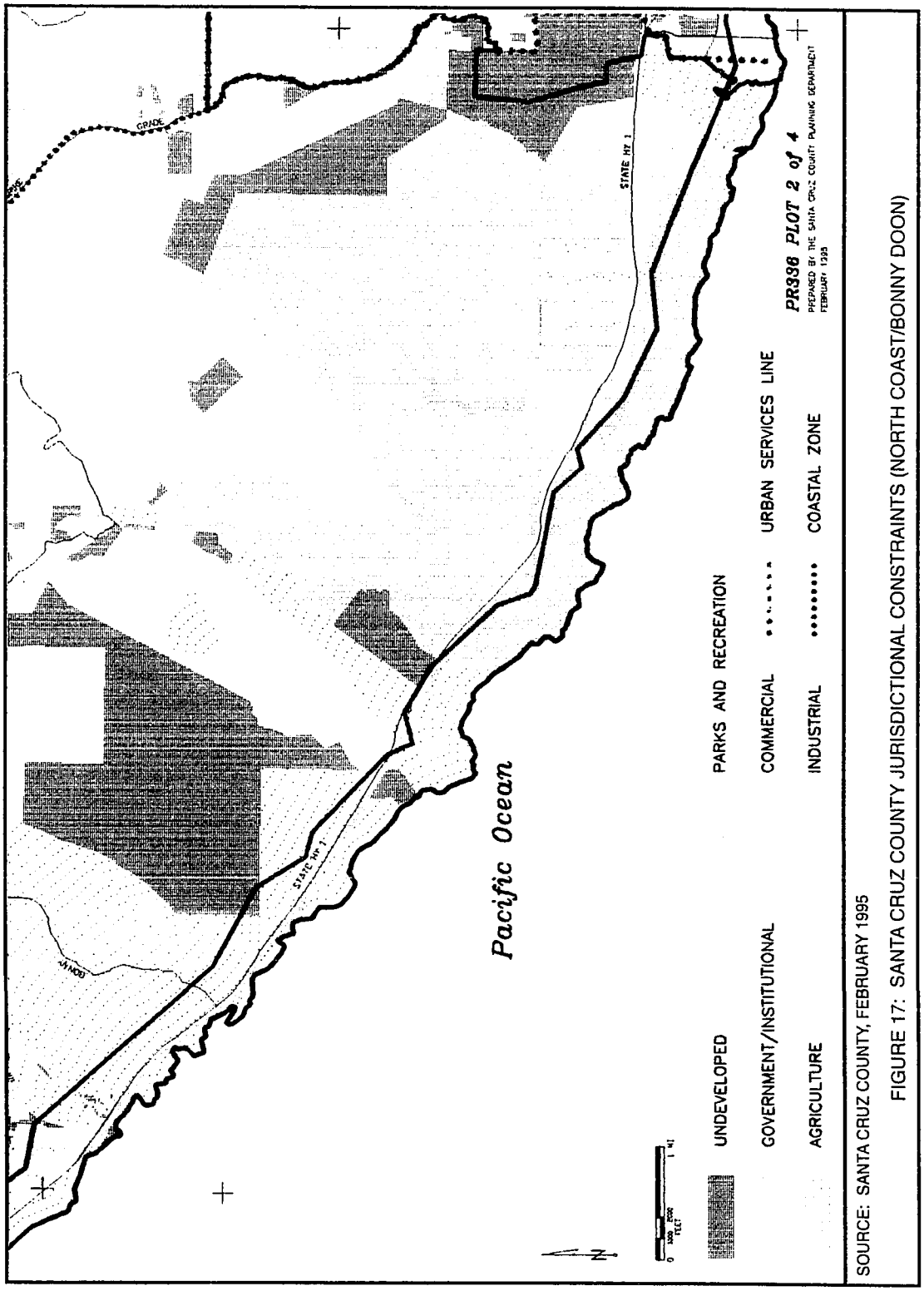



FIGURE 15: CONSTRAINTS ANALYSIS SEGMENTS



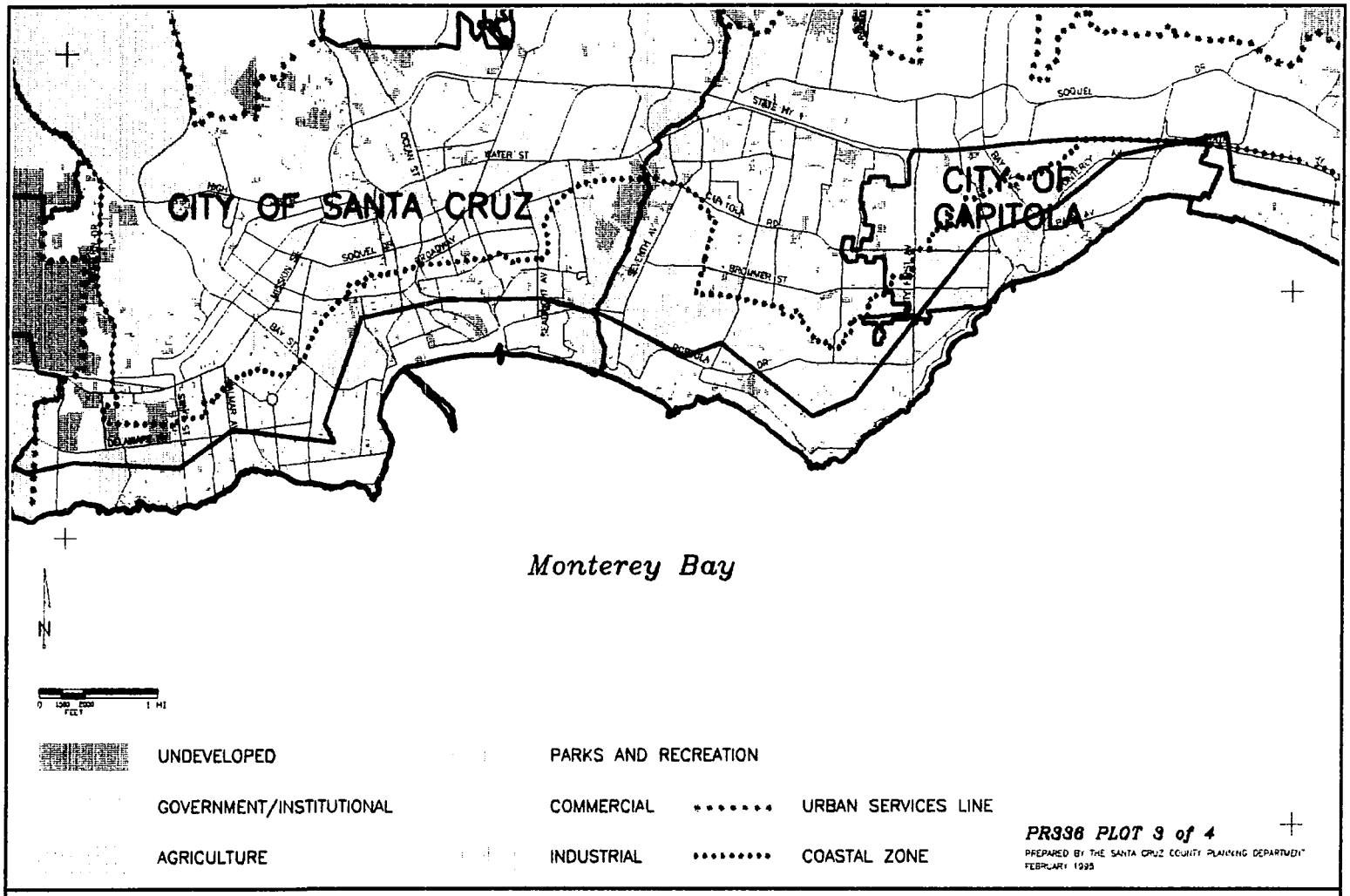

SOURCE: SANTA CRUZ COUNTY, FEBRUARY 1995

FIGURE 16: SANTA CRUZ COUNTY JURISDICTIONAL CONSTRAINTS (NORTH COAST)



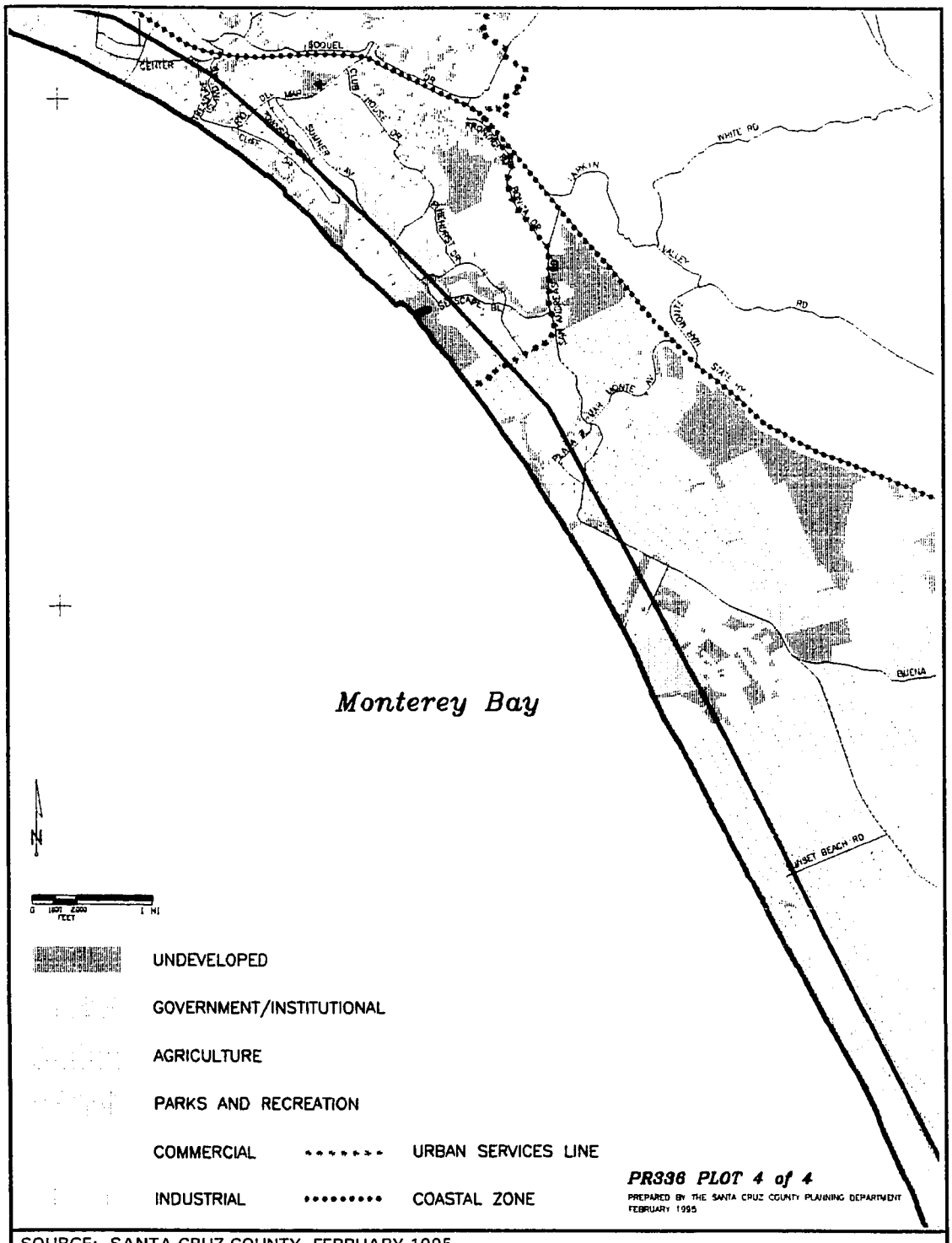

SOURCE: SANTA CRUZ COUNTY, FEBRUARY 1995

FIGURE 17: SANTA CRUZ COUNTY JURISDICTIONAL CONSTRAINTS (NORTH COAST/BONNY DOON)




SOURCE: SANTA CRUZ COUNTY, FEBRUARY 1995

FIGURE 18: SANTA CRUZ COUNTY JURISDICTIONAL CONSTRAINTS (SANTA CRUZ/CAPITOLA)




SOURCE: SANTA CRUZ COUNTY, FEBRUARY 1995

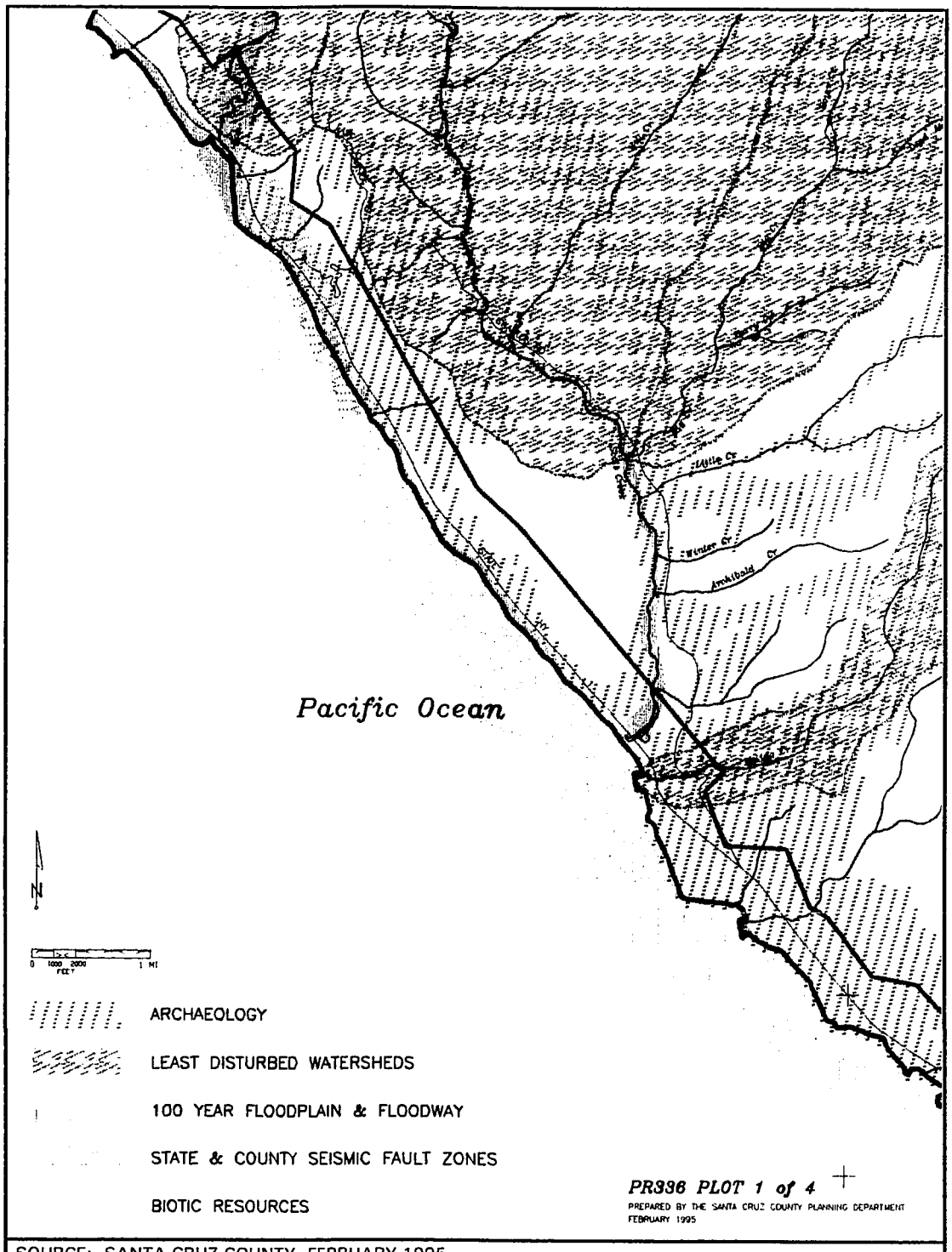
FIGURE 19: SANTA CRUZ COUNTY JURISDICTIONAL CONSTRAINTS (APTOS/SAN ANDREAS)

and topographic maps. Figures 20 through 23 depict the environmental constraints of primary concern. While other conditions not represented on these computerized geographic maps would be helpful, additional overlays would tend to mask all the information presentable at this scale.

For Monterey County, the project area was evaluated using LCP maps and resource maps on file at the County's planning offices. After a review of this information, maps for those segments having potentially viable sites were prepared as figures. For example, jurisdictional constraints for the North County LCP (Monterey County) are shown in two sections (Figures 24 and 25). Jurisdictional constraints associated with industrial, residential, commercial, recreational, and special land uses are depicted and compared with policies contained within the jurisdiction LCP.

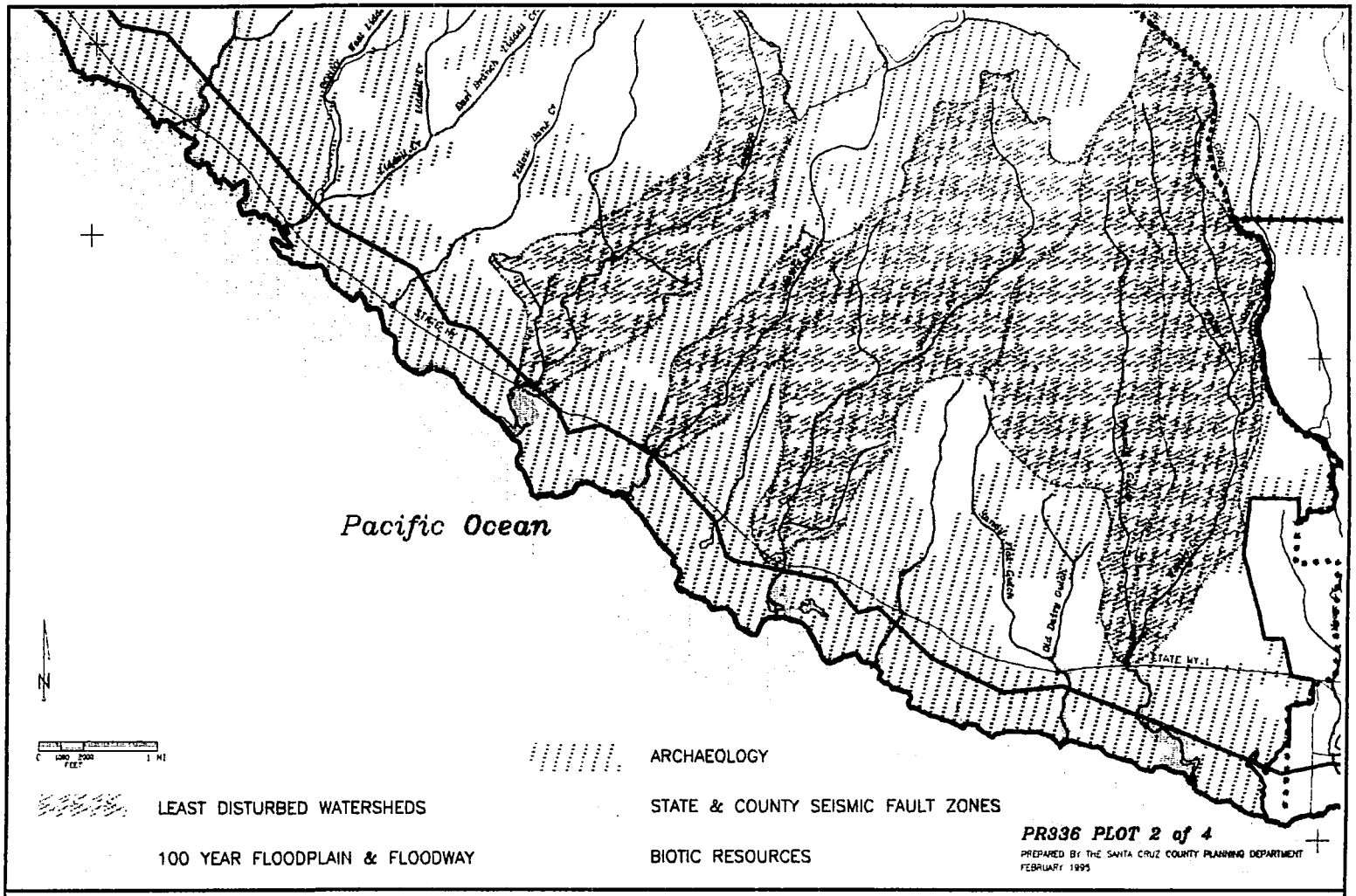
Environmental constraints for the North County LCP are depicted on a single graphic (Figure 26). Within this segment, rare species habitat, wetlands, prime agricultural soils, and coastal dunes are of primary environmental importance. Similar land use and environmental information is shown for the Moss Landing Harbor Segment (Figure 27). This planning map shows specific sites for education/scientific and aquacultural activities as of 1987.

Within the City of Monterey, several coastal segments are situated within a narrow area: Laguna Grande/Roberts Lake, Del Monte Beach, Monterey Harbor, and Cannery Row. Their locations relative to each other are shown in Figure 28. More detailed representations of the Del Monte Beach and Cannery Row coastal segments are provided on Figures 29 and 30. For the Carmel coastal segment, Figures 31 and 32 present existing land use conditions. These detailed maps were useful in the geographic analysis of jurisdictional and environmental information.



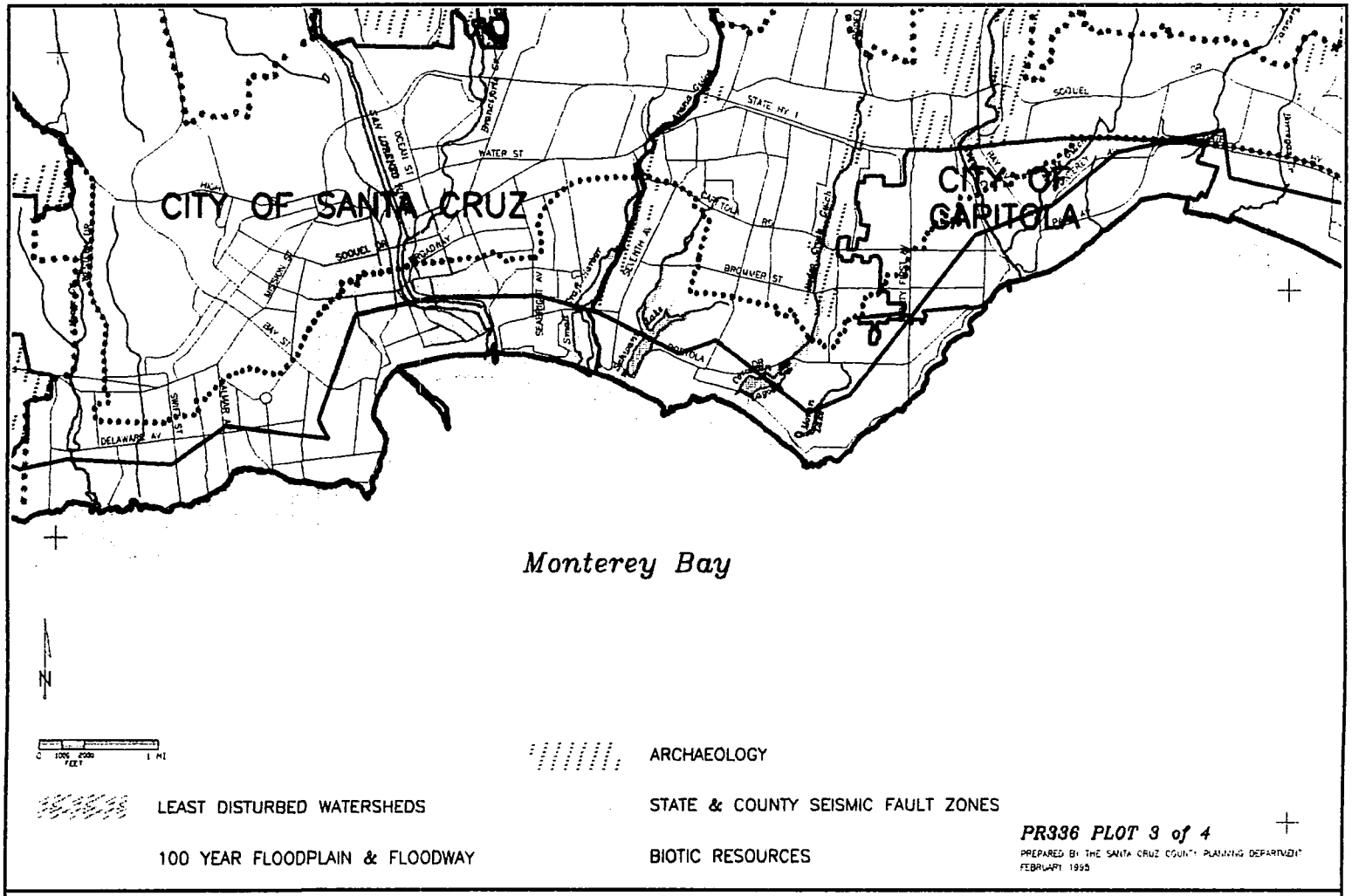

SOURCE: SANTA CRUZ COUNTY, FEBRUARY 1995

FIGURE 20: SANTA CRUZ COUNTY ENVIRONMENTAL CONSTRAINTS (NORTH COAST)



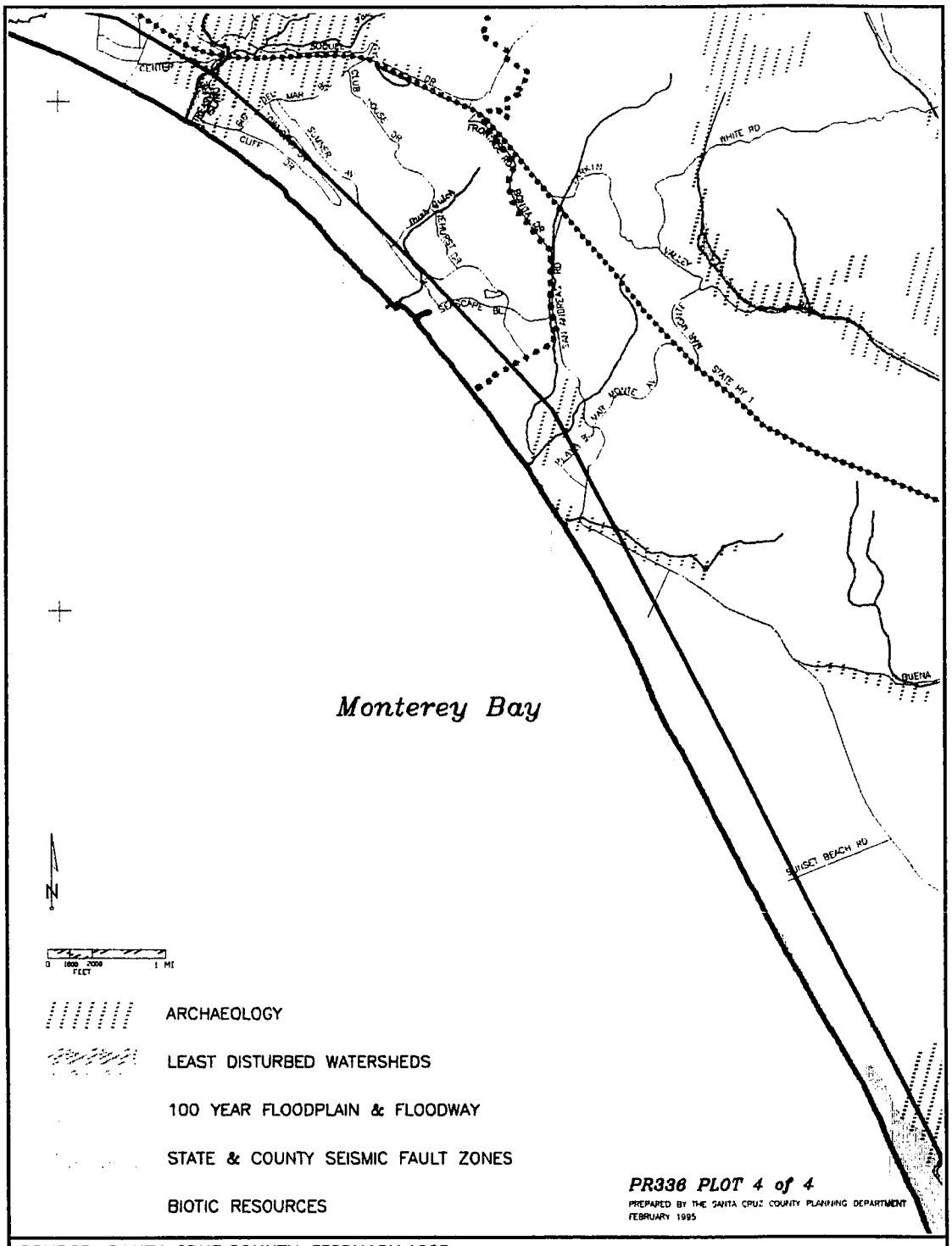

SOURCE: SANTA CRUZ COUNTY, FEBRUARY 1995

FIGURE 21: SANTA CRUZ COUNTY ENVIRONMENTAL CONSTRAINTS (NORTH COAST/BONNY DOON)




SOURCE: SANTA CRUZ COUNTY, FEBRUARY 1995

FIGURE 22: SANTA CRUZ COUNTY ENVIRONMENTAL CONSTRAINTS (SANTA CRUZ/CAPITOLA)




SOURCE: SANTA CRUZ COUNTY, FEBRUARY 1995

FIGURE 23: SANTA CRUZ COUNTY ENVIRONMENTAL CONSTRAINTS (APTOS/SAN ANDREAS)

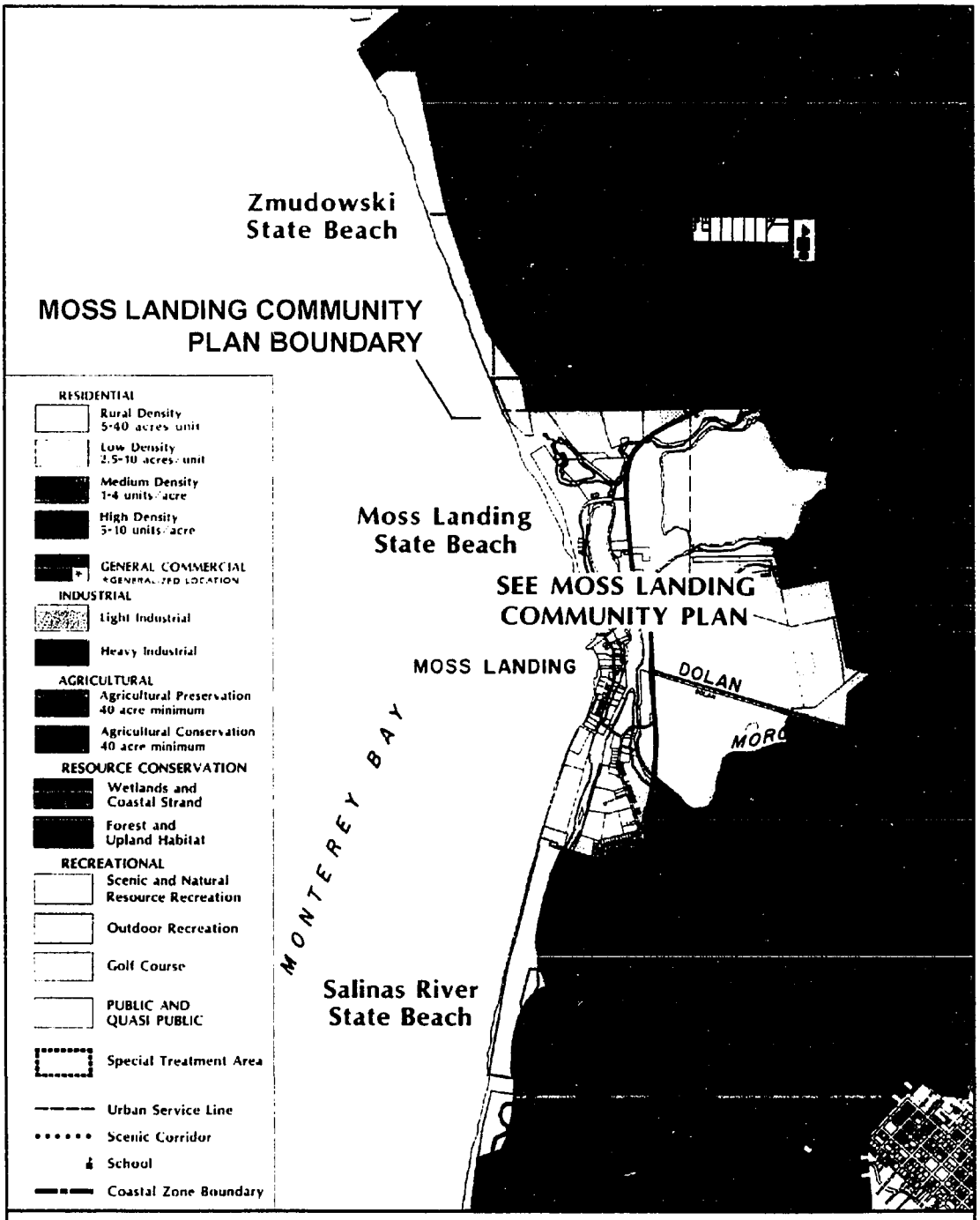



FIGURE 24: MONTERY COUNTY NORTH COAST JURISDICTIONAL CONSTRAINTS

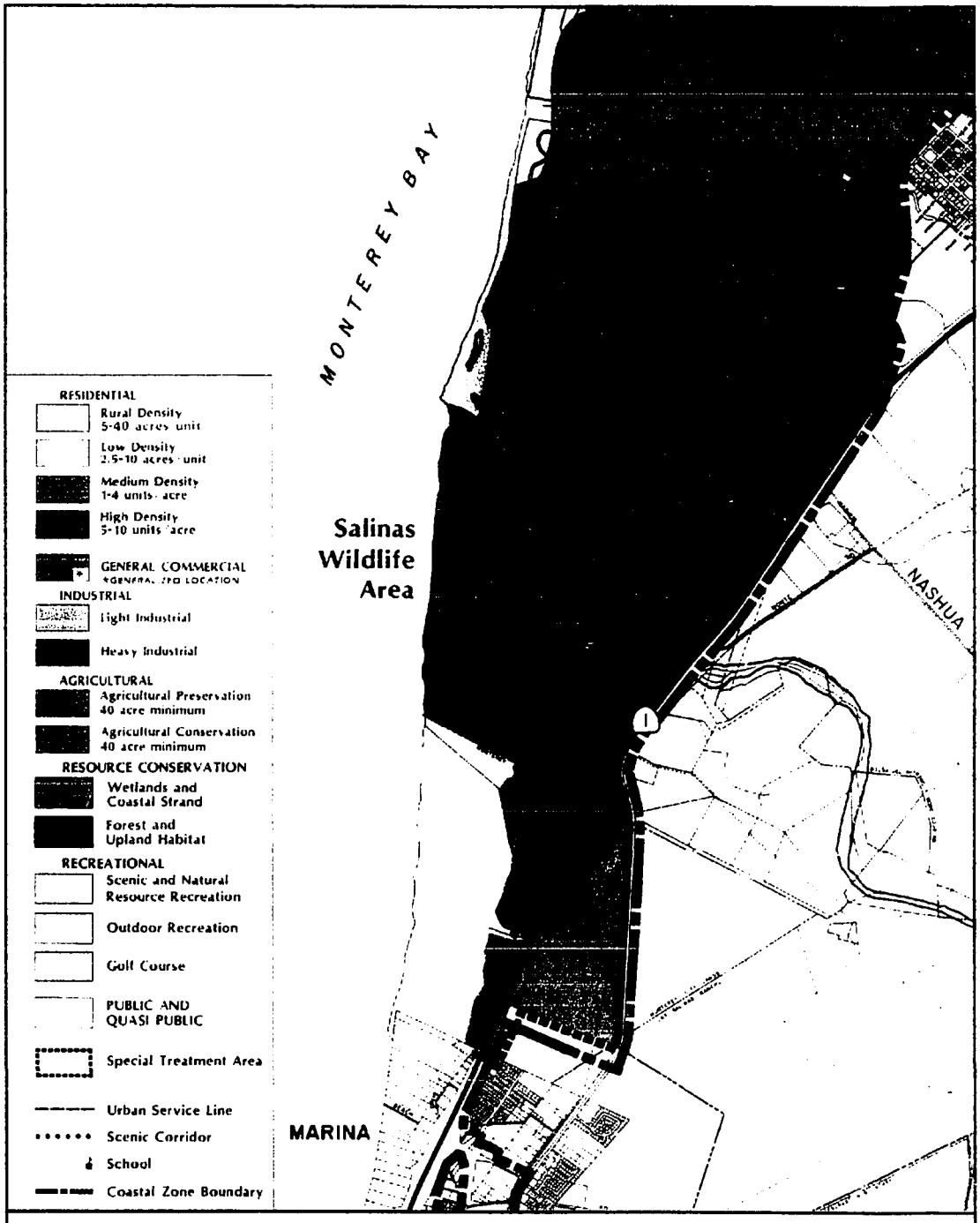



FIGURE 25: MONTEREY COUNTY NORTH COAST JURISDICTIONAL CONSTRAINTS

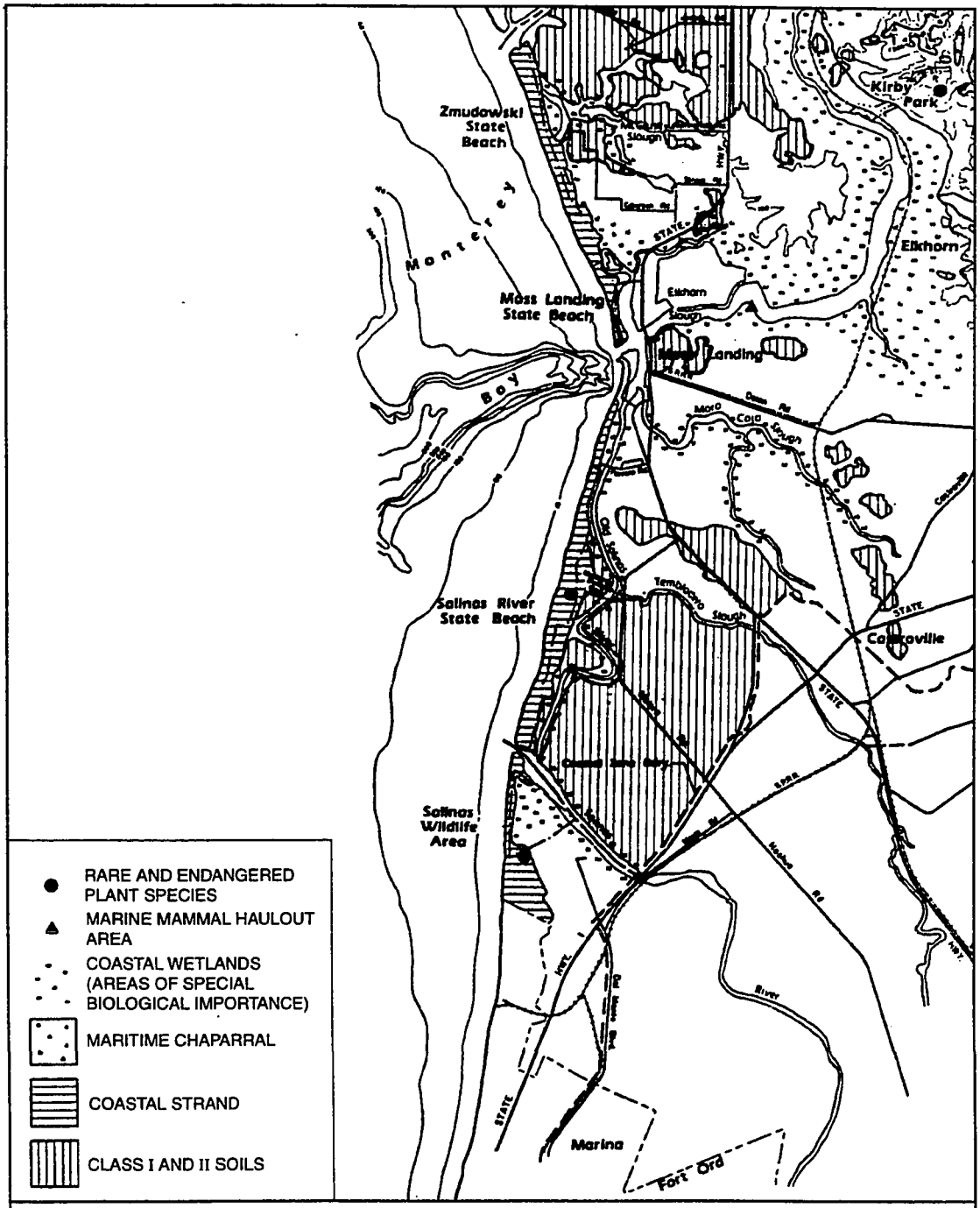



FIGURE 26: MONTEREY COUNTY NORTH COUNTY ENVIRONMENTAL CONSTRAINTS

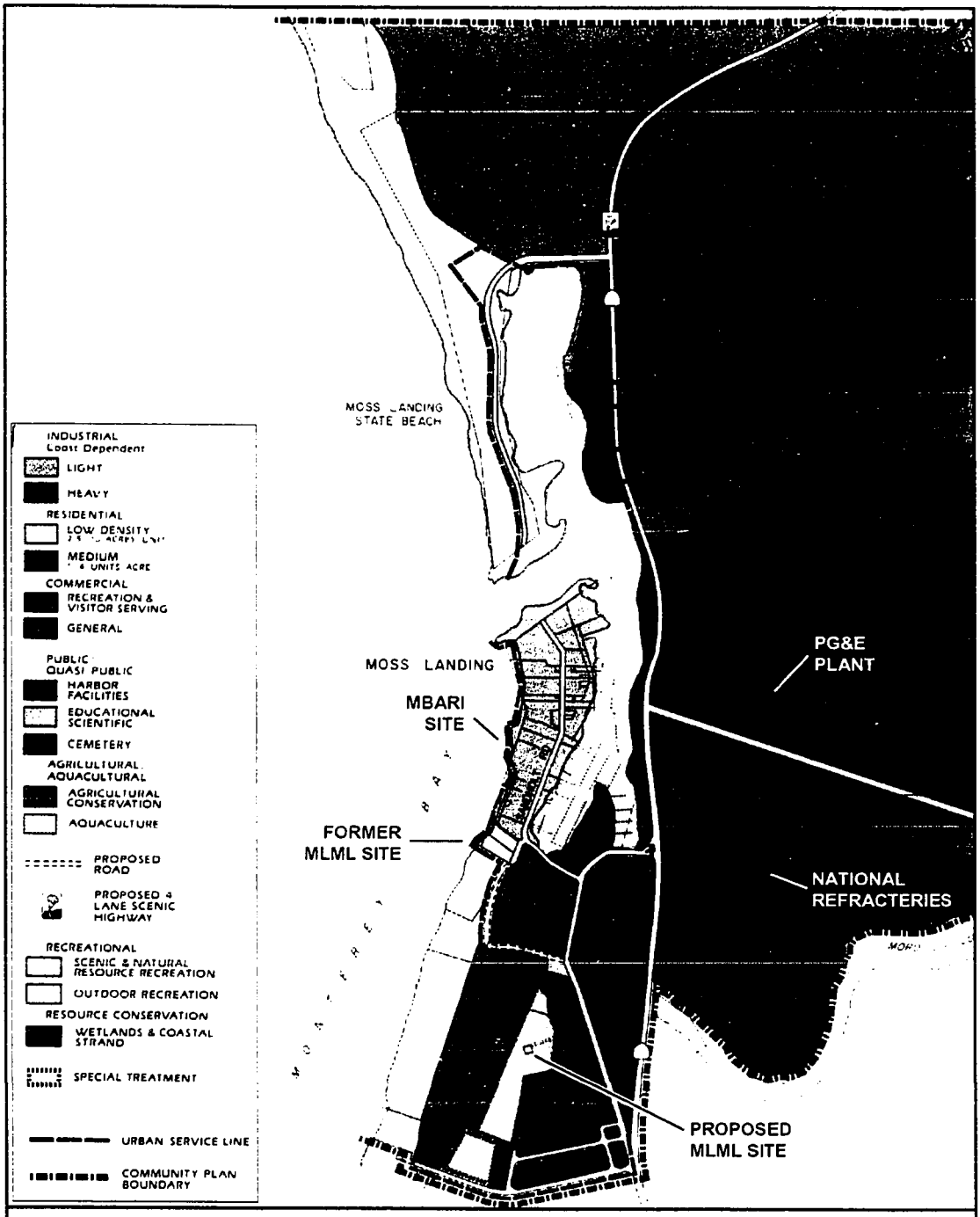
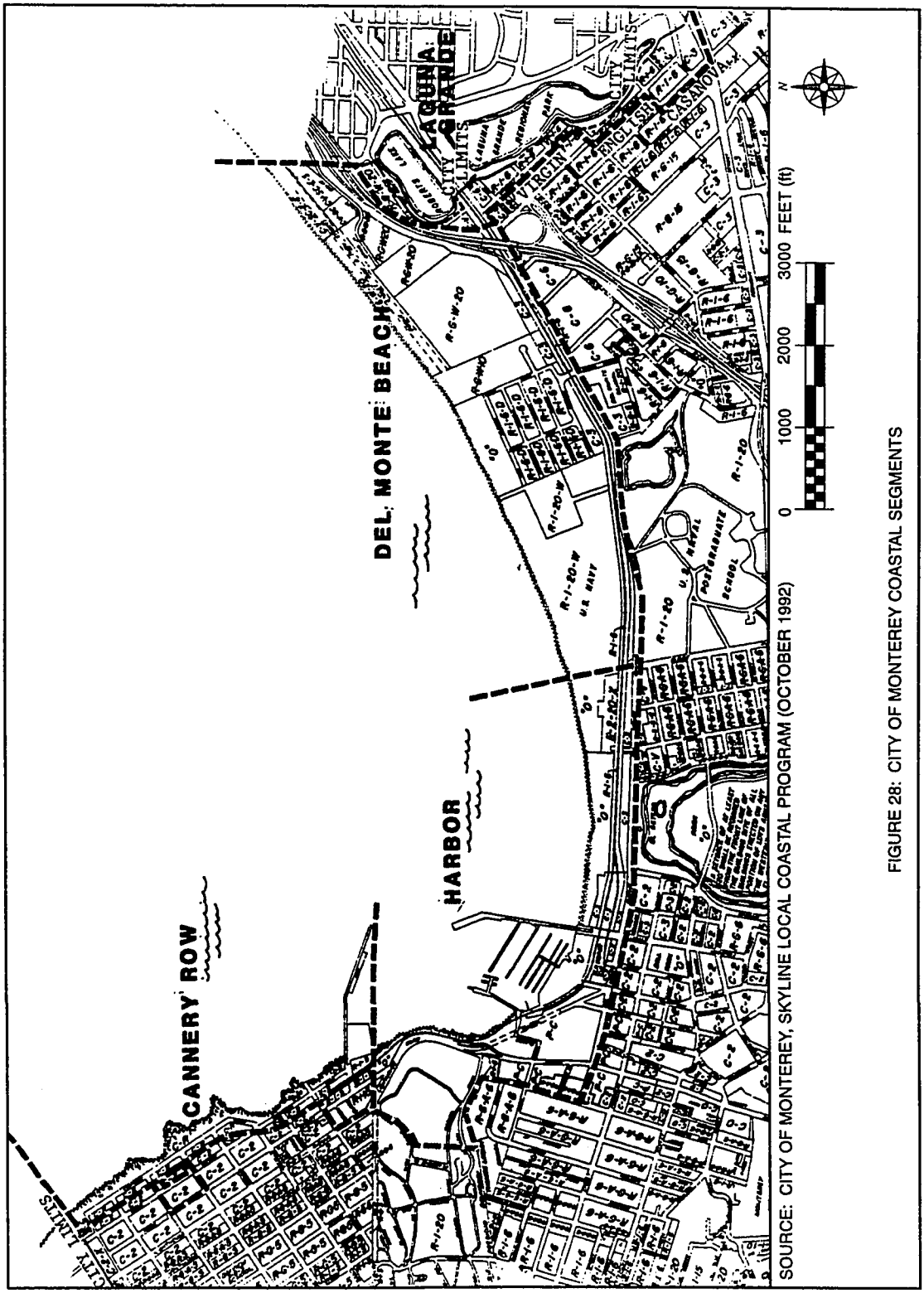



FIGURE 27: MOSS LANDING COMMUNITY LAND USE




SOURCE: CITY OF MONTEREY, SKYLINE LOCAL COASTAL PROGRAM (OCTOBER 1992)

FIGURE 28: CITY OF MONTEREY COASTAL SEGMENTS

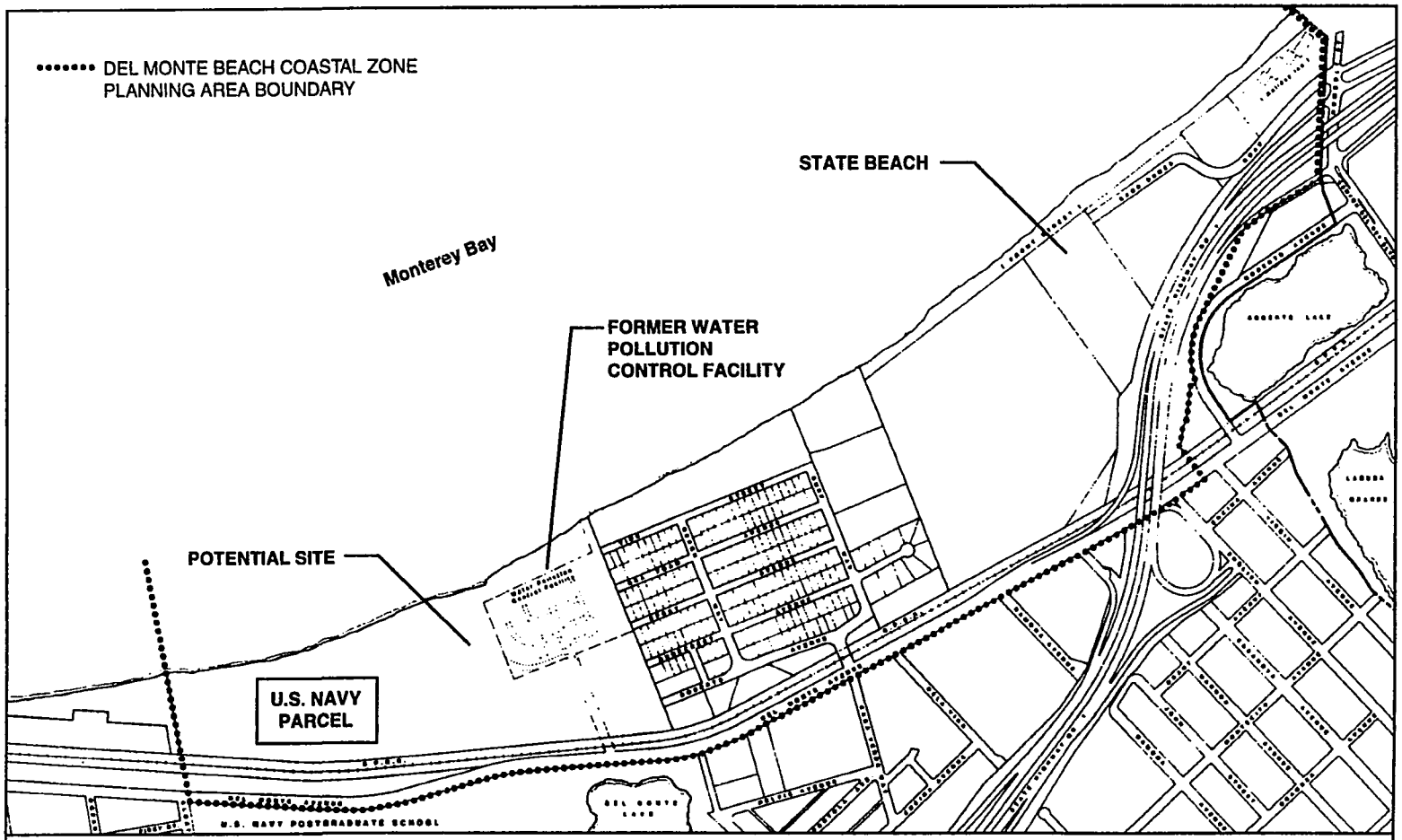
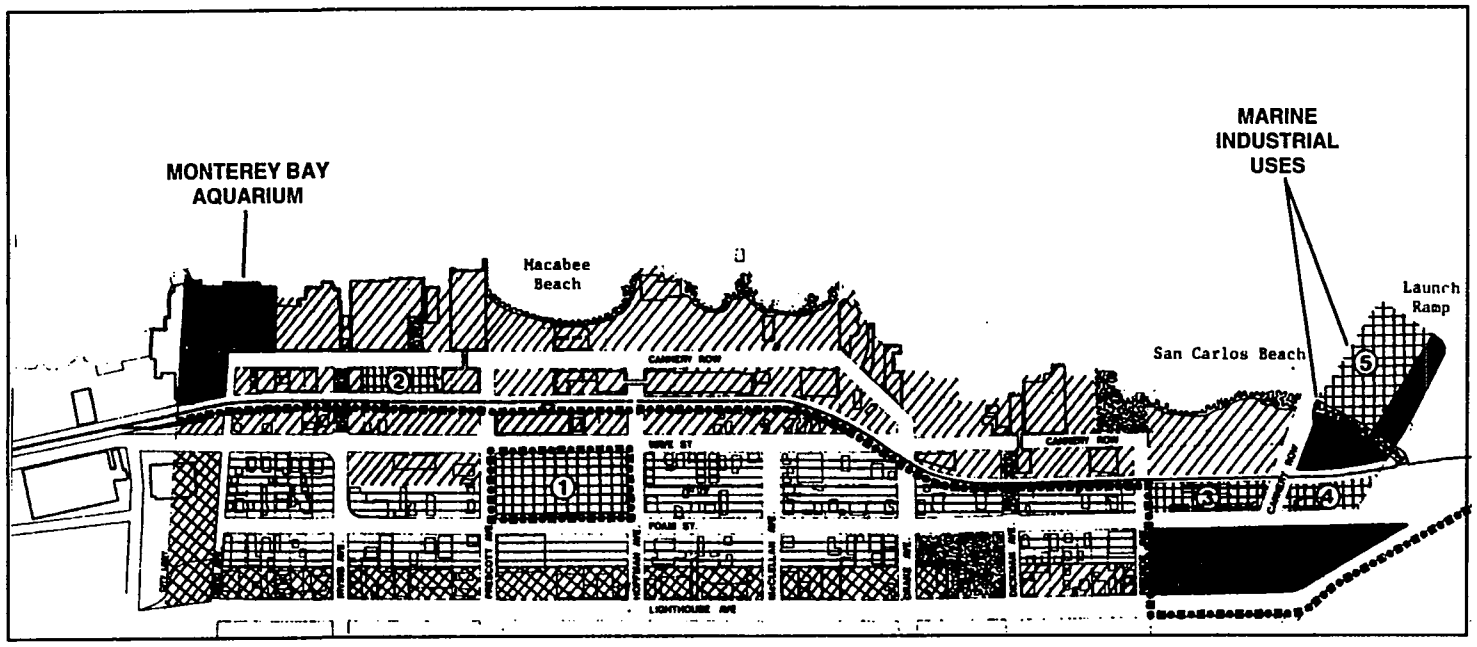



FIGURE 29: DEL MONTE BEACH COASTAL SEGMENT




SOURCE: CITY OF MONTEREY, CANNERY ROW LOCAL COASTAL PROGRAM (NOVEMBER 1981)

FIGURE 30: CANNERY ROW COASTAL SEGMENT

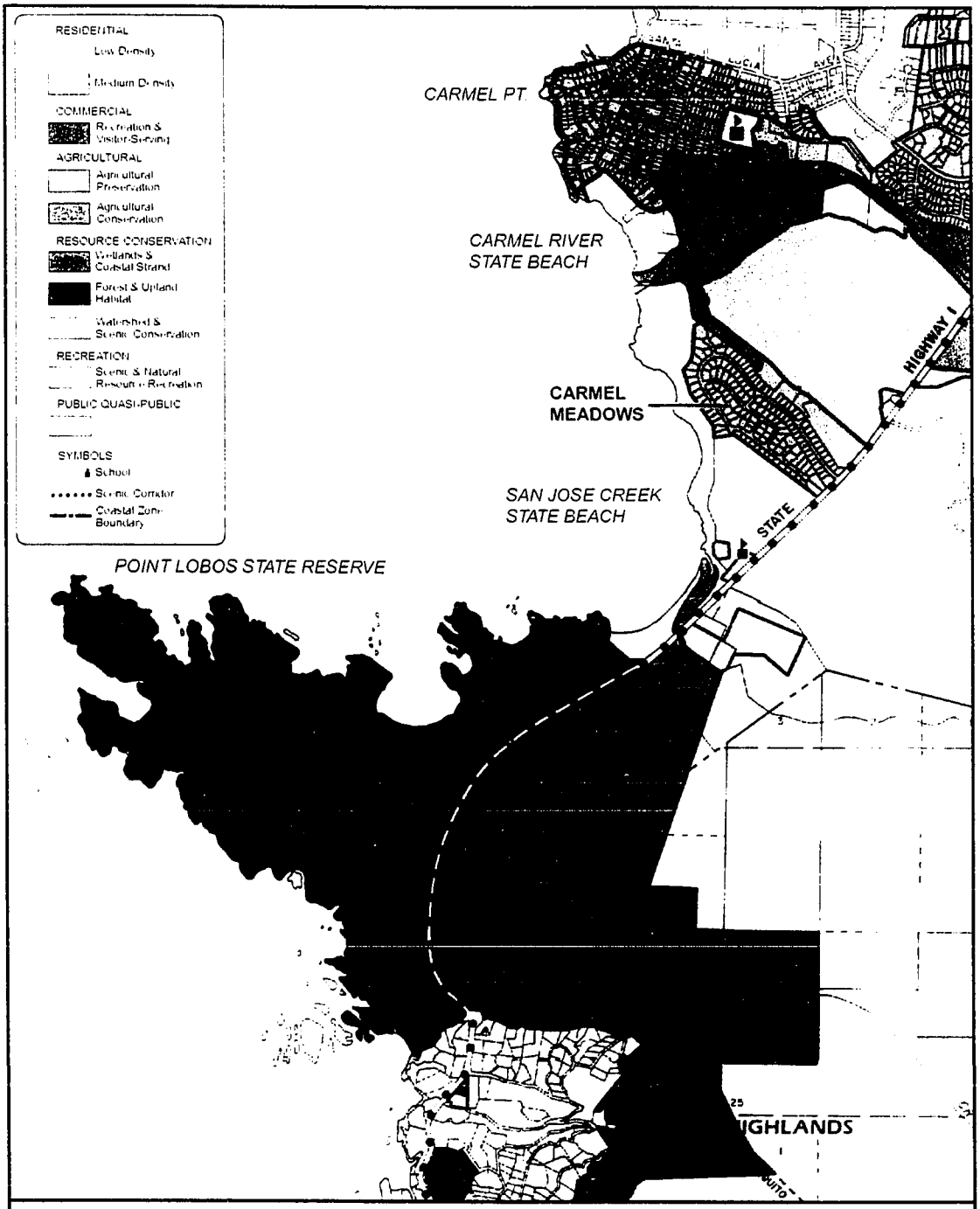



FIGURE 31: CARMEL AREA COASTAL SEGMENT

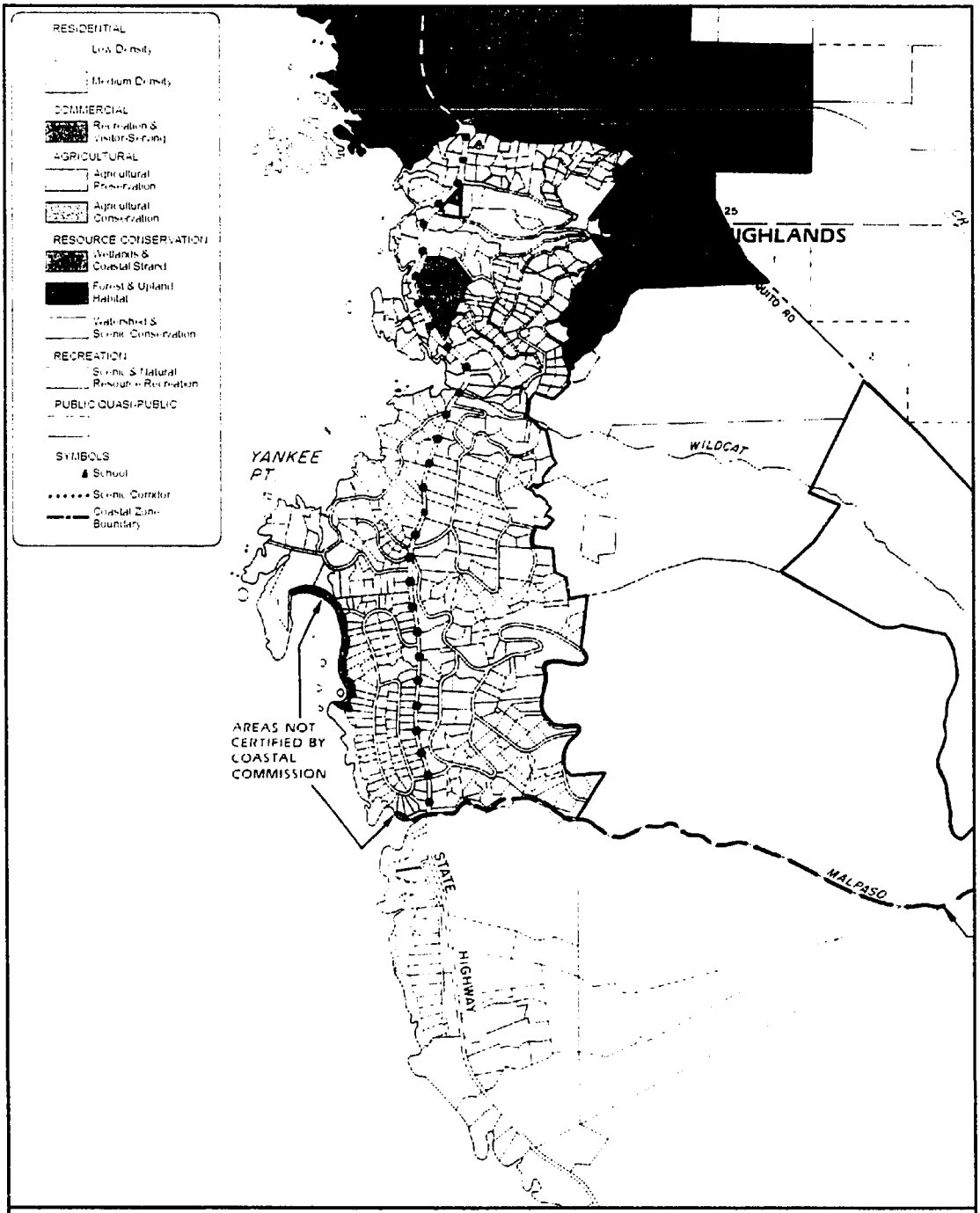



FIGURE 32: CARMEL AREA COASTAL SEGMENT

An analysis of jurisdictional and environmental information, as well as operational constraints, for the 18 shoreline segments is provided in data forms presented in Appendix A; however, a synopsis of the data has been prepared in the following section. The product of that analysis is the identification of specific Site Areas to be considered for future use or further expansion of coastal-dependent research, education, and mariculture activities. In many cases, a specific category of coastal-dependent use is deemed more appropriate. The following geographical analysis is summarized in Table 4 as a matrix and is an indication of potential site areas that are present within the project area.

## Santa Cruz County

North Coast Segment

The North Coast Segment begins at Big Basin Redwoods State Park and continues south to the town of Davenport. The coastal area within this region consists of steep cliffs and coastal terraces. Predominant land uses are for agriculture, parks, and recreation. Occasional land uses are residential and commercial. This region is removed from the urbanized areas of Santa Cruz to the south and Half Moon Bay to the north.

Few developments are allowed on lands zoned for agriculture or parks and recreation. A commercial zone near Davenport is the only land area in the coastal segment with this designation. The steep cliffs and bluffs severely restrict most coastal development and many of the terraces above the shore are considered prime farmland. Any coastal-dependent facilities in this area would be somewhat isolated from urban support systems, such as transportation and utilities, and from other research organizations and programs.

Mariculture is the most likely coastal-dependent land use to potentially occur within this segment, although very resource-specific research and monitoring endeavors may be

**Table 4. – Matrix of Potential Site Areas**

| Segment (Site Area #) | Number of Site(s) | Potential Acres | Zoning or Use |
|---|---|---|---|
| Santa Cruz County | | | - |
| North Coast (#1) | 1 | 20 | Agr/Com |
| Bonny Doon | 0 | 0 | Agr/Res |
| City of Santa Cruz (#2) | 1 | 40 | Res/Rec |
| Live Oak | 0 | 0 | Rec/Res |
| City of Capitola | 0 | 0 | Res/Com |
| Aptos (#3 and #4) | 2 | 35 | Rec/Res |
| La Selva | 0 | 0 | Rec/Res |
| San Andreas (#5) | 1 | 10 | Res/Agr |
| Monterey County | | | – |
| North County | 0 | 0 | Res/Agr |
| Moss Landing Harbor (#6) | 1 | 15 | Com/Res |
| Laguna Grande/Roberts Lake | 0 | 0 | Rec/Sen |
| Del Monte Beach (#7) | 1 | 60 | Sen/Gov |
| Monterey Harbor (#8) | 1 | 10 | Com/Res |
| Cannery Row (#9) | 1 | 5 | Com/Sen |
| Del Monte Forest | 0 | 0 | Rec/Res |
| Carmel | 0 | 0 | Res/Sen |
| Big Sur | 0 | 0 | Sen/Rec |
| Totals | 9 | 195 | – |

Agr = Agricultural
Com = Commercial
Res = Residential
Rec = Recreational
Sen = Sensitive Resources
Gov = Government

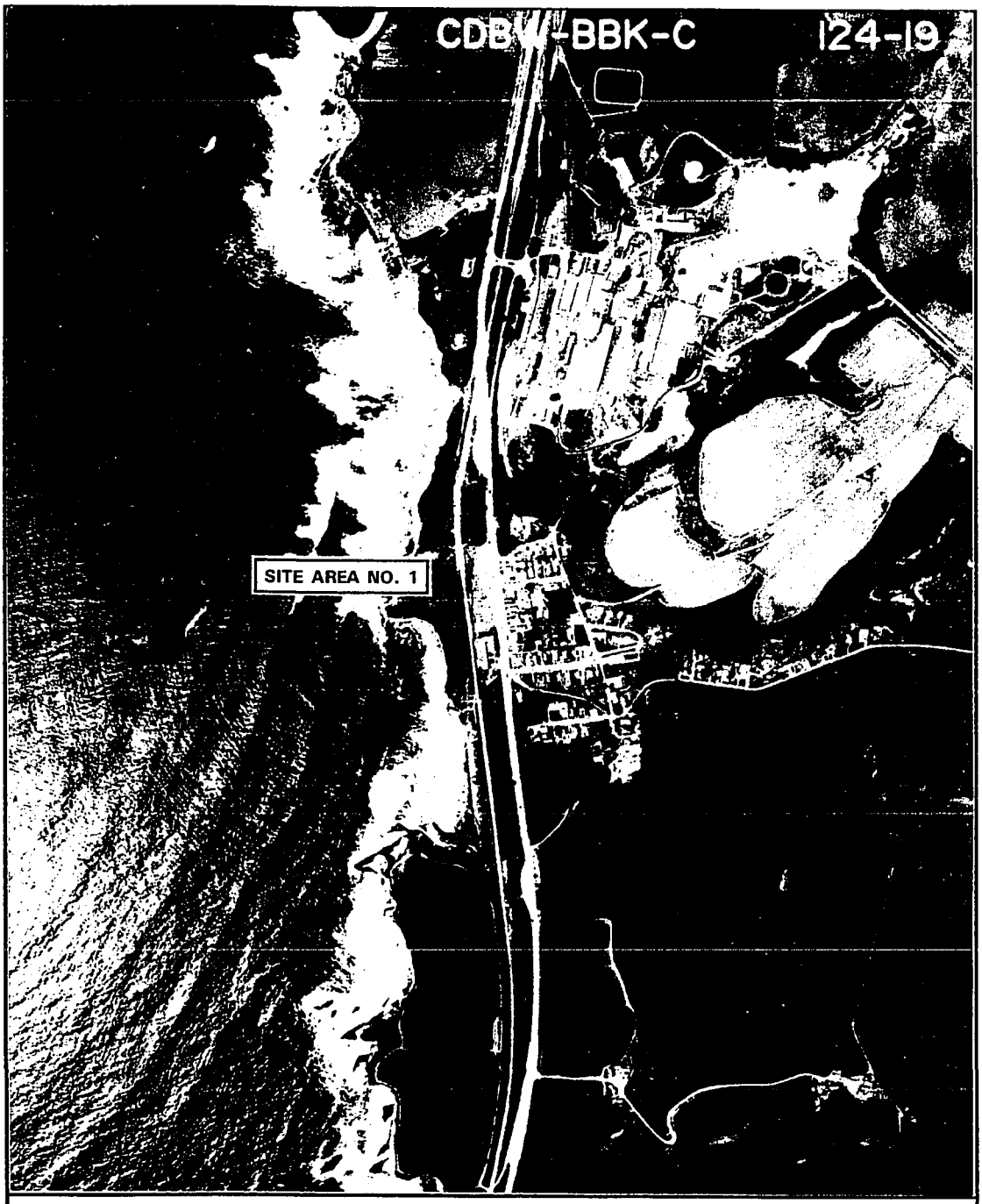
possible in certain areas. Davenport Landing may have potential for mariculture, particularly if shoreline access is necessary, but the area is bounded by agricultural land uses and is not a feasible point for most ocean research vessels. Terraces closer to the town of Davenport do offer some limited areas for the siting of facilities, particularly between the cliffs and the coast highway (see Figure 33). Site Area #1 is near the commercial zone at Davenport, at a location where some mariculture endeavors could utilize a seawater pumping system. Pacific Mariculture has been operating in a similar fashion in this area. Additional information on conditions within this coastal segment is provided in Appendix A (see page A-1).

Bonny Doon Segment

This coastal segment lies between the town of Davenport and the western city limits of Santa Cruz. The area is predominantly agricultural with areas of designated parks and recreation.

Similar to the North Coast segment, this region is constrained by prime agricultural lands, coastal cliffs and bluffs, and lack of infrastructure. Most locations are outside of the urban boundary; therefore, development would not be consistent with the scale and purpose of existing land use objectives.

A low potential for coastal-dependent siting opportunities exists in this region. Smaller, resource-specific monitoring activities may be feasible, perhaps at existing parking and structures located at Wilder Ranch; however, no specific sites were considered viable for larger research, education, or mariculture uses requiring direct access to the shore. Additional information is contained in Appendix A (see page A-3).




SOURCE: CALIFORNIA DEPARTMENT OF BUILDINGS AND WATERWAYS, APRIL 1993

0 1000 2000 FEET (ft)

FIGURE 33: AERIAL PHOTO OF DAVENPORT (NORTH COAST SEGMENT)

City of Santa Cruz Segment

The coastal area within the City of Santa Cruz city limits defines this coastal segment. Much of the coastal fringe has been built upon or is designated for specific public recreational and visitor-serving uses or as commercial/residential properties. One exception is the Westside Lands area which includes the Terrace Point properties at and adjacent to the UCSC Long Marine Laboratory at the western city limits.

The Terrace Point property is a undeveloped 60-acre parcel that has been used for agriculture and as an open-space area between urban development within Santa Cruz and the agricultural lands to the north. A proposed development project at the site calls for a mixture of residential, coastal-dependent, coastal-access, and commercial development. This property has been identified as a primary location for potential coastal-dependent land uses to be expanded or established and is identified as Site Area #2 (see Figure 34). The existing coastal-dependent labs, tanks, and research facilities at Long Marine Lab are immediately to the north on lands bounded by Younger Lagoon.

No other properties were identified as viable within this coastal segment. Additional information concerning conditions within the city of Santa Cruz are contained in Appendix A (see page A-5).

Live Oak Segment

This coastal segment is bounded by the city of Santa Cruz and the city of Capitola, and includes the unincorporated area of Live Oak in Santa Cruz County. Land uses consist largely of developed properties for recreation and residential housing.

Constraints associated with the development of coastal-dependent research and education are the lack of undeveloped or underutilized land space, the presence of recreation, housing, erodible cliffs, and the poor water quality of the region.

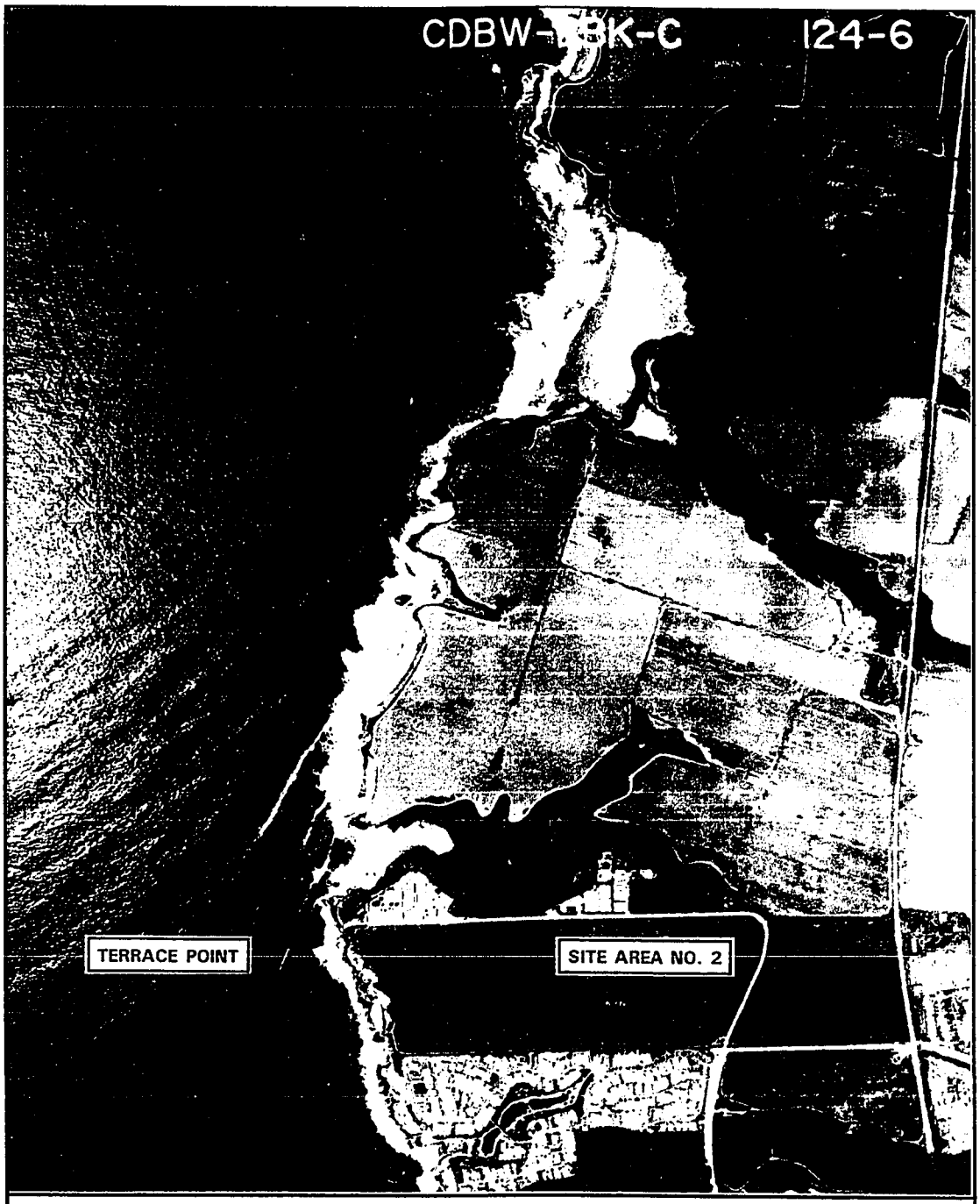



FIGURE 34: AERIAL PHOTO OF TERRACE POINT (SANTA CRUZ SEGMENT)

No viable sites were identified in this coastal segment. One property designated as Public Facilities within a residential area is limited in size. Another parcel at Corcoran Lagoon is physically separated from the coast and tidal influences by East Cliff Drive. Coastal-dependent development at these properties would neither be consistent with the adjacent land uses nor be preferable from an operational standpoint. More information on the conditions within this coastal segment is presented in Appendix A (see page A-7).

City of Capitola Segment

The City of Capitola does not have any properties specifically designated as coastal-dependent or coastal-related. The majority of uses are visitor-serving and residential, with a significant amount lateral coastal area subject to steep cliffs and severe erosion. Few areas were identified which would support a research, education, or mariculture facility. In as much as visitor information and educational displays are coastal-related, such a facility would be congruent with selected visitor-serving endeavors or public facilities. No specific locations were identified for this purpose. Additional information is presented in Appendix A (see page A-9).

Aptos Segment

The Aptos Segment lies between New Brighton State Beach and the community of Rio Del Mar. The area consists of an long sandy coastline with low to moderately high bluffs along most portions of the segment. Most development lies immediately inland from the State Beach and on lots at the base of the bluffs where the sand extends farther above the maximum high tide line. Most parcels on the terraces above the coastal bluffs are developed, with some lots available amidst residential housing. Two parcels were identified where direct coastal access would be limited; however, pumping of seawater may

be feasible to support a relatively large-scale compliment of laboratories and tanks on sites over 10 acres.

Facility siting issues are related to access to the shoreline through a State beach, and the appropriate zoning issues associated with developments located within solely residential land use areas. Nonetheless, two properties have been proposed for future consideration and are identified as Site Areas #3 and #4. They offer the necessary size and proximity to the shore for consideration as a site for coastal-dependent research, education, or mariculture operation (see Figure 35). The nearest similar land use is at Long Marine Lab and at Moss Landing. Additional information is contained in Appendix A (see page A-11).

La Selva Segment

This coastal segment extends from Rio Del Mar, past La Selva Beach, to Manresa State Beach. Most of the land use is associated with the State Park and with agriculture. Areas with residential and undeveloped lands are also present.

The constraints on coastal-dependent developments in this area are principally from prime agricultural areas, state parks and recreation areas, residential areas, and, to a lesser extent, coastal bluffs and sand dune environments. Environmental constraints associated with watersheds, floodplains, and sensitive biotic resources, however, were not widespread within this segment.

No sites were identified within this segment due to the proximity of pre-existing land uses, as mentioned above. More information is contained in Appendix A (see page A-13).

San Andreas Segment

This coastal segment lies between Manresa State Beach and the Santa Cruz-Monterey county line at the mouth of the Pajaro River. Land use is composed of agriculture, residential development, and, at the southern portion of the segment, recreation (Sunset

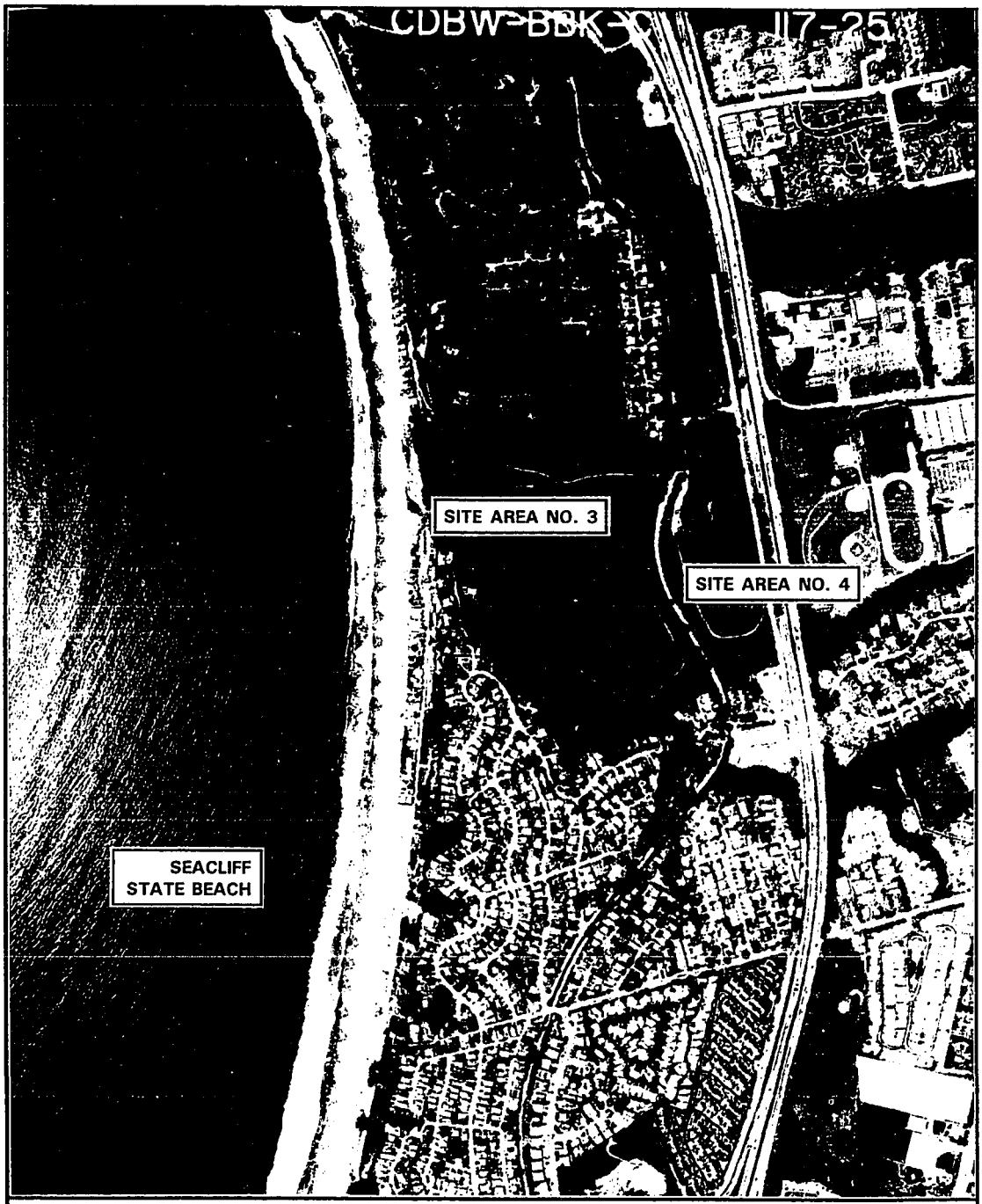



FIGURE 35: AERIAL PHOTO OF RIO DEL MAR (APTOS SEGMENT)

State Beach). Sensitive dune environments become more prevalent at the southern portion of the study area.

Development is severely constrained by agriculture land use and residential developments. Cliffs are present inland from the coastal fore dunes. Undeveloped areas without these constraints are few. Sites within the State Beach property may be feasible where land is not utilized for habitat, recreational, or access needs. Potential underutilized parcels are few, but their availability and viability as sites for coastal-dependent land uses associated with monitoring, research, education, or, perhaps, mariculture may be worth consideration. Note that sensitive biological resources are abundant in the region.

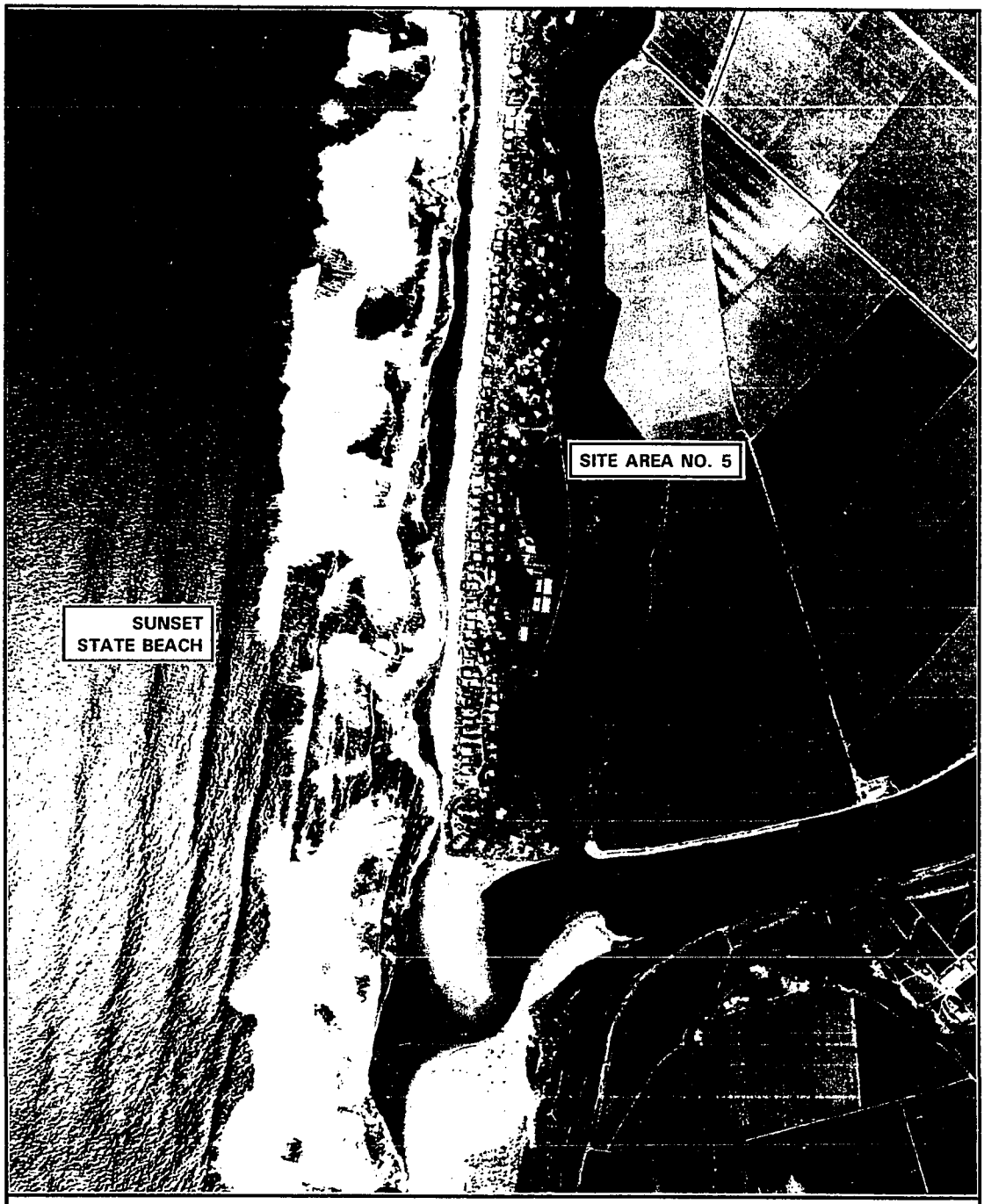
One adequately sized site was identified on state-owned land near the Pajaro River. While this site is not optimal due to its location between Watsonville Slough to the east and existing development to the west, it does represent a location for possible future consideration for larger facilities. The property is identified as Site Area #5 and is located about three-quarter mile south of West Beach Road (see Figure 36). For additional information on conditions within this segment see Appendix A (see page A-15).

## Monterey County

North County Segment

The North County Segment of Monterey County includes the coastal strand starting at Zmudowski Beach State Park to the Salinas River State Beach. Moss Landing Harbor, situated within this northern part of the county, is evaluated separately within the next section.

The area is constrained by a variety of environmental factors, such as unique sand dune areas, wetlands, sloughs, floodplains, and other areas having sensitive biota. Several




SOURCE: CALIFORNIA DEPARTMENT OF BUILDINGS AND WATERWAYS, APRIL 1993

0 1000 2000 FEET (ft)

N

FIGURE 36: AERIAL PHOTO OF PAJARO RIVER (SAN ANDREAS SEGMENT)

portions of the segment include the presence of river and slough outfalls into the Monterey Bay. Adjacent areas are typically agricultural areas. The city of Marina lies at the southern end of the segment. This area contains several developments and sand dune lots which are located within the immediate coastal region, some of which have been identified for some form of coastal-dependent or industrial development.

An approximately 10-acre site identified in the North County LCP as appropriate for coastal-dependent, and other, land uses is on or adjacent to sand dune habitat. Because of the presence of sensitive habitat, this are is not considered viable for further consideration. General conditions are discussed in Appendix A (see page A-17).

Moss Landing Harbor

The Moss Landing Harbor segment is analyzed separately from the North County Segment due to its wide variety of land uses and the existence of coastal-dependent activities in this region. Moss Landing Harbor contains a port facility for commercial and recreational fishing, sailing, vessel repair, as well as other commercial and industrial operations.

Existing land uses in the harbor include support facilities for the commercial fishing industry, such as seafood processing, fishing fleet support services, and coastal-dependent research and education facilities for MBARI, MLML, and the Sea Grant Program. Recreational areas at the north and south end of the harbor are present, such as Moss Landing State Beach. Mariculture has been present in the harbor and surrounding areas for over ten years. Much of the harbor area, specifically the "island" which fronts the Monterey Bay west of the PG&E power plant, is built-out or is in the process of renovating existing facilities. MBARI is completing one of three phases of research facility development at this location, with plans to share facilities with several other educational and mariculture programs.

Surrounding the immediate harbor area are coastal sand dunes and strands leading to the north and south sides of the river mouth for the Old Salinas River. Elkhorn Slough lies east of the harbor entrance and receives recognition as a national research and preservation area. Based on the current and proposed build-out of available properties on the "island" at Moss Landing Harbor, as well as site search activities already performed for the proposed MLML facility, the preferred site for MLML at "water tower hill" is the sole viable site identified. It is identified as Site Area #6 (see Figure 37). Additional information regarding the Moss Landing Harbor coastal segment is contained in Appendix A (see page A-19).

Laguna Grande/Roberts Lake Segment

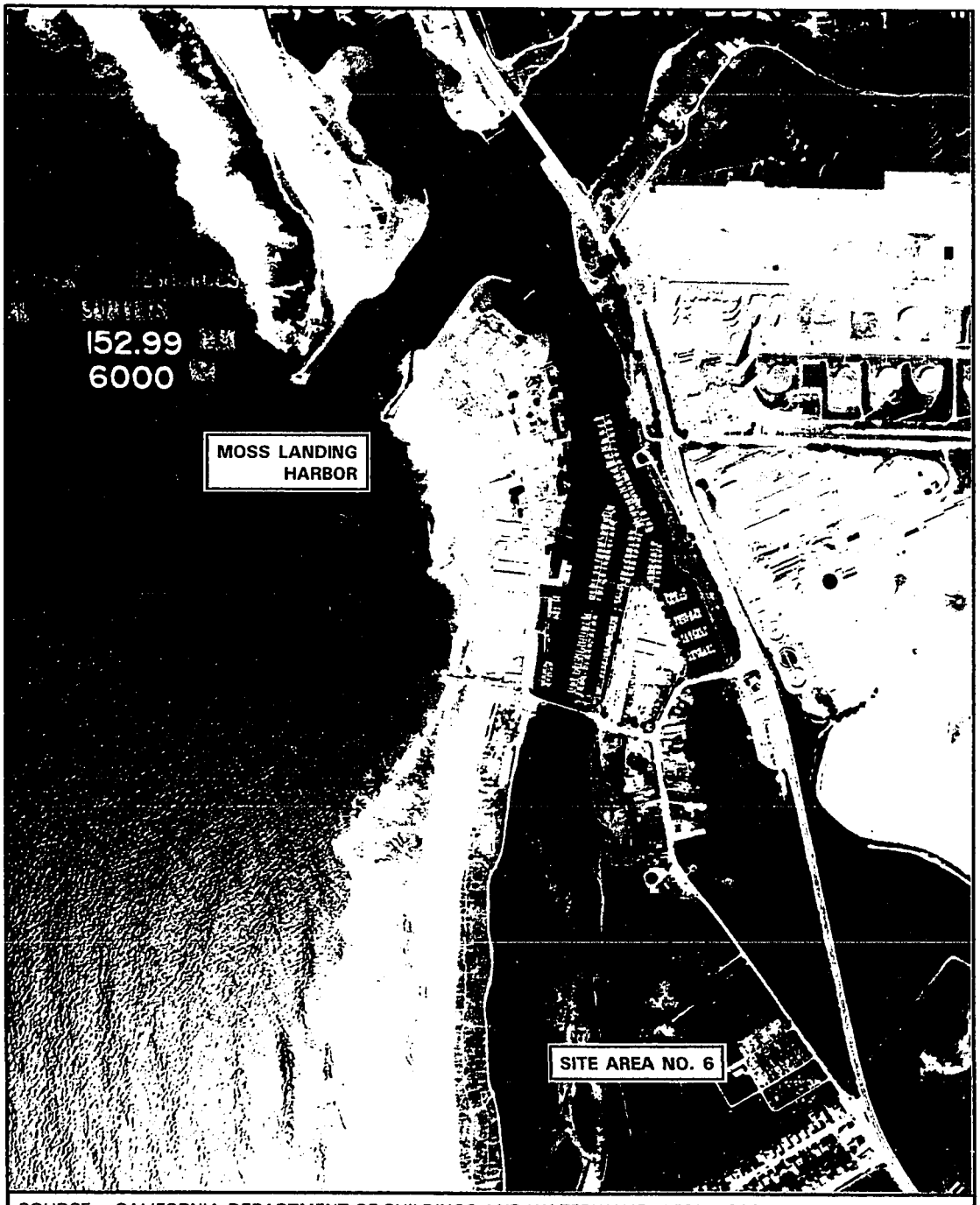
A short lateral section of dune and sandy beach tidal area make up the shoreline section of this coastal segment. Inland from the immediate shoreline and adjacent sand dunes is Route 1 and Laguna Lagoon.

The area is constrained by a fragile coastal strand and dune vegetation. The provision for assured public coastal access without designated access areas has led to erosion and destruction of dunes and dune grasses.

Siting opportunities for most coastal-dependent land uses are few and no appropriate developable land areas have been identified. A constraints analysis for this segment is contained in Appendix A (see page A-21).

Del Monte Beach

The Del Monte Beach segment lies between Roberts Lake and the Navy Post Graduate School located in the city of Monterey. This coastal segment contains a variety of land uses, including lateral strands of sandy beach and open dune, park land, residential housing, abandoned industrial sites, and undeveloped lots with remnant dune habitat.




SOURCE: CALIFORNIA DEPARTMENT OF BUILDINGS AND WATERWAYS, APRIL 1993

0 1000 2000 FEET (ft)

N

FIGURE 37: AERIAL PHOTO OF MOSS LANDING (MOSS LANDING SEGMENT)

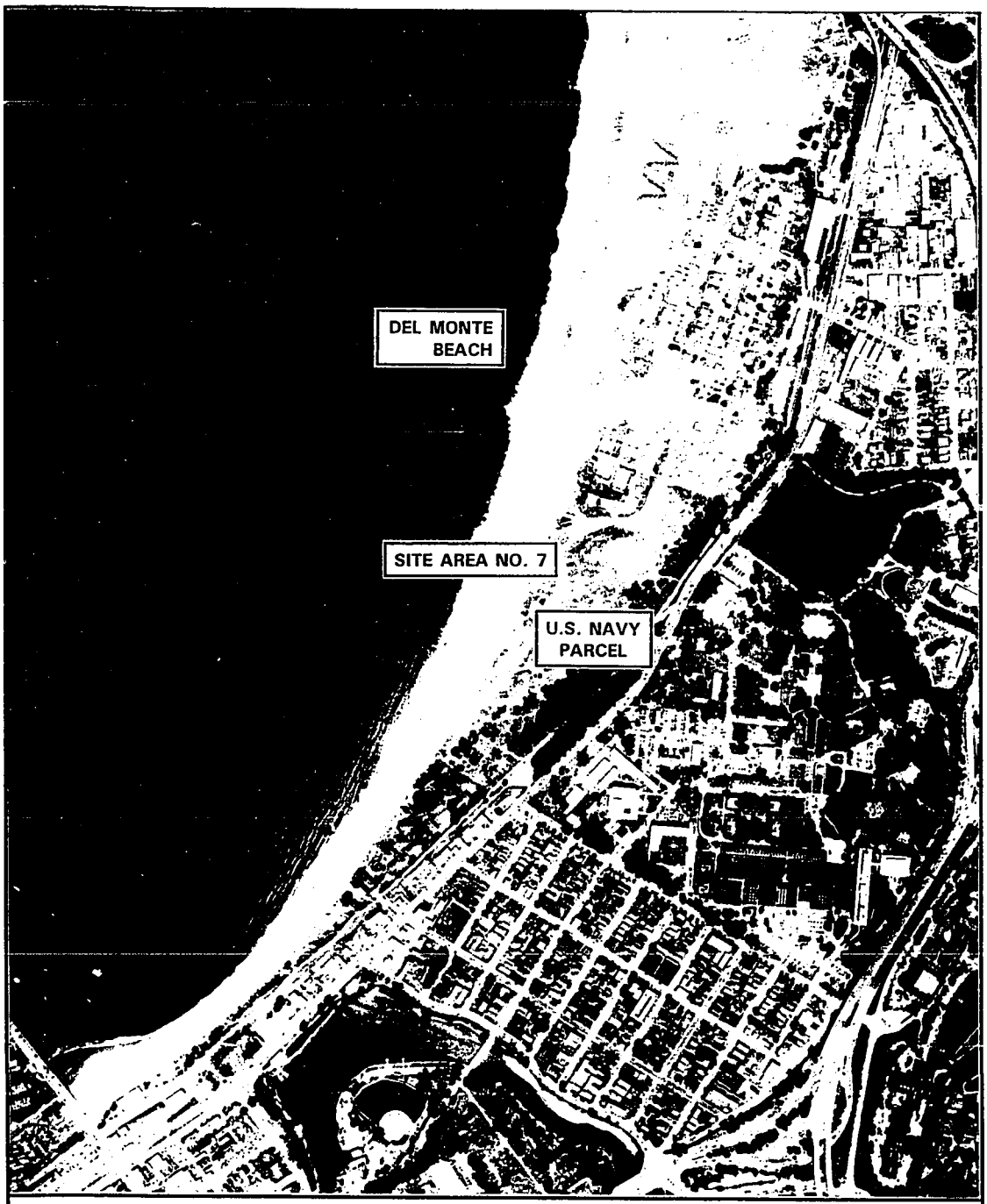
Constraints within this area center around the protection of dune habitat, the availability of fresh water for future developments, visual aesthetics, and accommodating public access and safety. Open properties in this area are typically associated with fringe or transitional dune habitat and vegetation. Development on these properties would require additional study and key mitigation and maintenance measures to ensure the vitality of sand dunes in the vicinity.

A single coastal property which is managed by the Department of the Navy has been identified as Site Area #7 (see Figure 38). Additional information concerning this coastal segment is contained in Appendix A (see page A-23).

Monterey Harbor Segment

This coastal segment is located at the Monterey Harbor and includes Fisherman's Wharf and Wharf #2, with its commercial fishing and visitor-serving attractions. Much of the land space in this segment has been built upon or is planned for specific land uses.

New development is constrained by restrictions created to bolster the commercial fishing industry. Coastal-dependent uses are those which serve the commercial fishing or boating industries. The size of facilities at the harbor is severely restricted and several areas are subject to seismic faulting or tsunami inundation. Historic landmarks and visual sightlines to the ocean are also of primary concern to planners. A property owned by Southern Pacific Railroad had been previously designated by the City as a site for coastal-dependent land uses; however, the property does not directly access the shore and is so linear in dimension that facility construction for most purposes would be difficult. The Defense Language Institute at the Presidio is currently used by the military but may face downsizing or elimination in coming years. An appropriate conversion to non-military uses would include coastal-dependent research and education.




SOURCE: CALIFORNIA DEPARTMENT OF BUILDINGS AND WATERWAYS, APRIL 1993

0 1000 2000 FEET (ft)

N

FIGURE 38: AERIAL PHOTO OF DEL MONTE (DEL MONTE BEACH SEGMENT)

No sites were identified for immediate use as a coastal-dependent land use; however, should the Presidio become available, it is considered to be a property with excellent potential for these land uses. This location is identified as Site Area #8 on Figure 39. Additional information concerning this coastal segment is located in Appendix A (see page A-25).

Cannery Row Segment

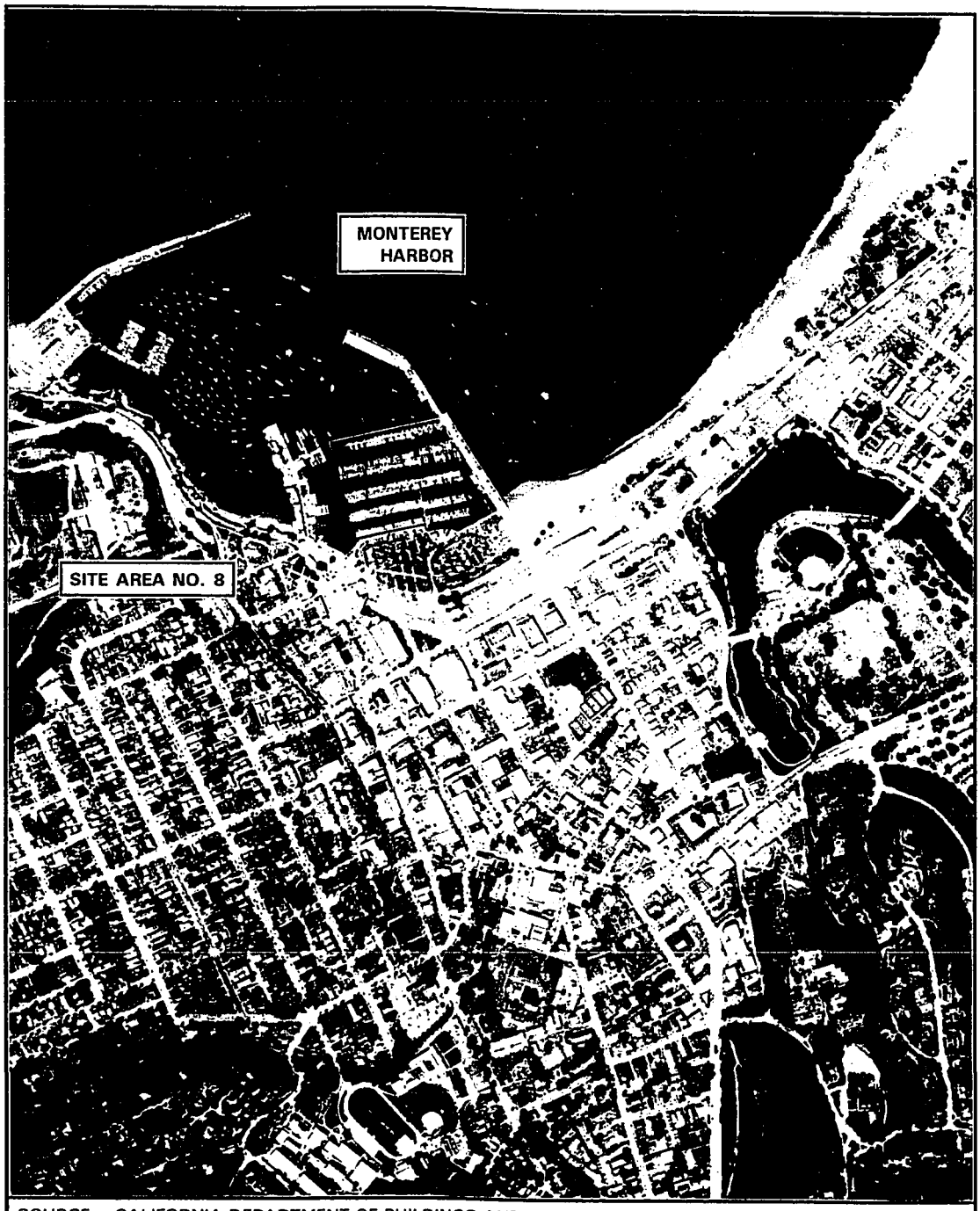
The Cannery Row coastal segment is bounded by the U.S. Coast Guard harbor facility and the Monterey city limits, located immediately beyond the Monterey Bay Aquarium. In this segment, the coastal zone is confined to approximately one city block from the Cannery Row waterfront.

Several marine research facilities are in the vicinity. An additional aquarium and visitor center at the Monterey Bay Aquarium is currently under construction. Likewise, the Hopkins Marine Station is preparing to increase its laboratory and aquarium space by adding a new building onto its property. MBARI has expanded to a new facility at Moss Landing, as previously stated. Land space restrictions in this area eliminates the possibility of the expansion beyond these existing proposals. A small parcel at Hopkins Marine Laboratory may have potential for additional buildout; however, this would restrict sightlines to the ocean and may limit existing parking.

The land area at Hopkins Marine Station has been identified as Site Area #9 on Figure 40. Additional information is contained in Appendix A (see page A-27).

Del Monte Forest Segment

The Del Monte Forest coastal segment is bounded by the Monterey city limits at Cannery Row, and continues south, past Pacific Grove, Asilomar State Beach and Cypress Point, to Carmel-by-the-Sea. The area consists of rocky shores and bluffs with adjacent




SOURCE: CALIFORNIA DEPARTMENT OF BUILDINGS AND WATERWAYS, APRIL 1993

0 1000 2000 FEET (ft)

N

FIGURE 39: AERIAL PHOTO OF MONTEREY (MONTEREY HARBOR SEGMENT)


SOURCE: CALIFORNIA DEPARTMENT OF BUILDINGS AND WATERWAYS, APRIL 1993

0 1000 2000 FEET (ft)

FIGURE 40: AERIAL PHOTO OF CANNERY ROW (CANNERY ROW SEGMENT)

recreational and residential land uses nearest to the coast. The "17 Mile Drive" lies along this portion of coastline.

Preservation and enhancement of existing natural areas and coastal viewsheds is a priority to planners, and therefore, a constraint to development. A major land feature within this segment is the coastal golf courses at Spanish Bay Country Club and the Spyglass, Cypress, and Pebble Beach golf courses. This land use and those supporting it are a protected institution within this jurisdiction. The waters nearest to the shore are also considered to be highly sensitive and appropriate for marine studies and monitoring activities. However, no sites exist within the project area that would accommodate coastal-dependent research and education.

Due to the presence of parklands, recreational and visitor-serving facilities, especially for golfing, no coastal sites were identified. Conditions within this coastal segment are contained in Appendix A (see page A-29).

Carmel Segment

This coastal segment begins at the northern boundary of the Carmel city limits and continues south, past Pt. Lobos State Reserve and Carmel Heights, to Malposo Creek. Superior scenic value and open, natural coastal views are present throughout the coastal segment.

Special areas have been designated by the local jurisdiction for specific development activities; however, the vast majority of coastal area is to be preserved in its natural state to retain its scenic value. Numerous areas containing sensitive coastal habitat have been identified, Pt. Lobos being the most obvious, with its state-protected status and associated research activities. Cliffs and bluffs are present throughout much of the segment, restricting accessibility to the shore.

While some field monitoring and education programs may occur in this segment, no sites for permanent research and management of marine programs were identified. The emphasis on retaining scenic values in existing coastal areas makes siting problematic. Sensitive natural resources in coastal areas also precludes locating facilities at Pt. Lobos State Reserve. Additional information regarding this coastal segment is contained in Appendix A (see page A-31).

Big Sur Segment

The Big Sur coastal segment is bounded by the steep western slopes of the Santa Lucia Mountains and rocky bluffs and offshore rocks along the coast. Many streams meet the ocean along this segment, and unique natural habitats are abundant along the coastal fringe.

Most development within this area is limited and is carefully planned with natural landscapes and historic preservation in mind. Coastal-dependent land uses may be permitted if no significant adverse visual impact would result. However, preservation of visual resources is extremely critical and few development proposals near the coast would conform to this restriction. Some smaller research and education activities may be appropriate and allowable within this segment, but their location would be entirely resource dependent.

Due to the local jurisdiction's strict visual resource preservation requirement, no sites were identified within this coastal segment. Additional information concerning this segment is contained in Appendix A (see page A-33).

# VI. CASE STUDIES

## Introduction

Numerous expansion and relocation plans have been developed within the project area for developments which require locations at or near the coast in order to function at all. Two recent proposals to expand marine research and education have been identified as appropriate case studies from which to learn how constraints analysis and the facility siting process can to be problematic.

The two proposals chosen are the Long Marine Laboratory expansion onto an adjacent property at Terrace Point in Santa Cruz and the relocation of the Moss Landing Marine Laboratories facilities to a preferred site at Moss Landing's "water tower hill." Both examples share the need to apply the jurisdictional, environmental, and operational siting constraints previously discussed. The circumstances affecting each of these constraint categories has been instrumental in causing schedule delays and downsizing of the originally proposed coastal-dependent development plans. Both of these examples are in the process of having planning documents and environmental studies reviewed and approved by local jurisdictions or state agencies.

## Long Marine Laboratory-University of California at Santa Cruz

Background

Joseph M. Long Marine Laboratory is located on the Westside Lands located just within the city limits of Santa Cruz. The facility is operated by the UCSC Institute of Marine Sciences for marine mammal research and education. LML lies on about 12 developable acres donated to the University of California by Santa Cruz in 1972 by Donald and Marion Younger. Using non-state, non-university funds, LML was built in 1977 and named after Joseph Long of Long's Drugs fame, who was a principal contributor. Through the guidance of UCSC's director of marine sciences, Bill Doyle, the Lab has been run in a classical institutional fashion and has been quite successful at paying for research from private grants and endowments. Aside from the scientific marine research activities, LML has been a vital link between UCSC and the Santa Cruz community, particularly via the docent program supported by community volunteers. LML consists of two six-acre terraces, the southern-most with offices, conference rooms, wet and dry laboratories, a bookstore, aquarium, and shop. Seawater is pumped from the ocean into two 35-ft high water storage tanks. Immediately west of Long Marine Lab and beyond a 12-ft high berm is Younger Lagoon, a 26-acre area which is part of the University of California Natural Reserve System.

Expansion of LML will strengthen the Monterey Bay area's knowledge-base within the marine sciences. A proposal to develop 12 acres within the adjacent 60-acre Terrace Point property has been proposed for several years. Several development plans have been put forward by Wells Fargo Bank, the current property land owner. All have included the development of rental and single-family housing as well as expansion of existing and newly proposed coastal-dependent and coastal-related land uses. Wells Fargo Bank has an agreement in principle with the University of California Board of Regents to allow for the

proposed LML expansion; provided that city approval is received for planned housing on much of the remaining acres. A 6.5-acre public coastal access area is also planned near the marine terrace bluffs at the site's southern boundary.

The parcel was obtained by Wells Fargo Bank in 1987 under a foreclosure action. Of the specific site plans prepared to date, each has a predominantly residential theme that is considered by many to be out-of-scale with the surrounding urban uses and existing infrastructure. In the Environmental Impact Report for Terrace Point prepared in 1994, the City of Santa Cruz and the CCC have concluded that the proposal does not conform to state and local goals contained in the City's General Plan or in the Coastal Act. Because the City's LCP has not been certified by the CCC, jurisdictional control of land use approvals rests with the CCC. Currently, a revised specific plan is now being developed by Wells Fargo and its consultants.

The latest specific plan calls for 200 homes and 336,000 square feet of floor space for coastal-dependent laboratories and offices, 30,000 square feet of retail space, and a LML visitor's center and museum, a hotel, coastal access, and areas designated only for wildlife and wetlands on the 60-acre parcel. In addition to LML and the Oiled Wildlife Rescue center, coastal-dependent activities expected to occupy the property are the USGS Pacific Marine Geology branch and NOAA's National Marine Fisheries Service laboratory (currently based in Tiburon).

The developers and the City of Santa Cruz have had difficulty coming to an agreement regarding the proper mix and density of housing, coastal-dependent facilities, and public and open-space land. In the 1992 *City of Santa Cruz General Plan and Local Coastal Program 1990-2005*, discrepancies were noted between the developers specific plan and the City's general plan. A citizens' group formed to counter proposals that feature a large residential mixture of land uses. Discussions between Well Fargo, the City, and interested citizens were held with the aid of a professional mediator. A large amount of time, money,

and effort was spent on the mediation process; however, it did not result in a proposal acceptable to either the City or the CCC.

Meanwhile, UCSC's Institute of Marine Science has prepared a master plan for the LML expansion on approximately 12 acres of the subject Terrace Point property. The preferred (Option II) plan contained in the *UCSC Institute of Marine Science Long Marine Laboratory Master Plan* includes an environmental quality and marine biosphere research building, a teaching laboratory building, expansion of the existing seawater system, a caretaker and visiting researcher apartment building, and continued expansion of a 1.5-acre commercial aquaculture operation. The proposed LML expansion alone would result in a six-fold increase in building floor space, a five-fold increase in staff, and a doubling of daily visitorship by the year 2005.

LML currently accommodates a Oiled Wildlife Rescue and Rehabilitation Center. LML's expansion includes the relocation of the USGS Branch of Pacific Marine Geology offices and research laboratory. The proposed USGS facility will replace the existing Deer Creek facility in Palo Alto, California. However, due to difficulties in committing development funds for the USGS relocation, this portion of the proposed coastal-dependent development is currently in jeopardy. The $15 million National Marine Fisheries Service Tiburon Laboratory would occupy additional laboratory and office space within the existing Terrace Point Plan.

Jurisdictional constraints have been introduced by both the governing policies within the coastal zone and the lack of policy within the General Plan. A steadfast policy detailing the proper mix of residential development has not been all presented by the City, requiring the CCC to judge the project inappropriate due to the project's discrepancies with the existing development density near the urban boundary. Environmental constraints have been applied due to the lack of credible studies performed to date. Discussions continue regarding the location and amount of prime agricultural land, jurisdictional wetlands, and

critical wildlife habitat. The ability to divert runoff, provide adequate traffic circulation, and improve infrastructure has also not been settled. It is believed that lack of coherent policy, poor constraints analysis by the project proponent, and an initial underestimation of the proliferation of coastal-dependent land uses led to the flawed proposals presented early in the process. This oversight has created a condition where public citizen's groups are suspicious of new proposals. It has also resulted in the City functioning in a reactive fashion to new environmental information and development options that must be addressed in the amended General Plan.

Early research and analysis coupled with timely, consistent, and accurate public information and input may have lessened the potential for action requiring time-consuming redrafts to the proposal and continued debate on the jurisdictional and environmental constraints faced by the developer.

### Moss Landing Marine Laboratories-California State University Extension

MLML is a research and education facility shared by San Jose State University and five other California State University campuses. Their master's level and undergraduate degree programs in marine sciences are nationally and internationally recognized, covering marine-related topics such as oceanography, marine ecology, taxonomy, and animal behavior. Average student enrollment at MLML is 145, with faculty and staff totaling 37. Up to 122 individuals use the labs during the day (LSA Associates 1994, 1).

Since the 1989 Loma Prieta earthquake damaged the Moss Landing Marine Laboratories (MLML) facility near the harbor at Moss Landing, MLML has been looking for a new coastal site. The MLML staff moved their operations from along the Old Salinas River to Salinas, 12 miles inland. As a coastal-dependent facility requiring access to seawater, tidal areas, estuaries, beach dunes, and the use of an ocean research vessel, many

of MLML's research grants for such research may be placed in jeopardy (Chui 1994, 4B). MLML also provides public education to those not enrolled in the state college system.

Due to MLML's need to have close proximity to a seawater system, the existing arrangement results in a splitting of operations into coastal and inland locations. While for some coastal-dependent endeavors this arrangement may be feasible, the research, field monitoring, and educational environment of MLML requires constant access to the marine resources under investigation. The study of the unique marine habitats in the area is a compelling reason for siting a single laboratory facility at Moss Landing. These studies areas include beaches and dunes environments, soft near-shore ocean bottom, the Salinas River, Elkhorn Slough, and the Monterey Bay submarine canyon. Proximity to an existing seawater intake system and harbor for ocean-going vessels provides vital support for these studies.

MLML is clearly part of a comprehensive marine and oceanographic research community at Moss Landing. The Lab relies on locally chartered vessels, commercial diving operations, and associated support facilities and services. MLML presence also attracts other research vessels and research organizations to the Moss Landing area, such as mariculture operations and MBARI, and is also involved in recreational and commercial fishery studies. A synergistic relationship has emerged at Moss Landing between the various categories of coastal-dependent activities.

MLML's relationship with MBARI, LML, Hopkins Marine Studies, Naval Post Graduate School, and Granite Canyon contribute to the area's knowledge and expertise in the marine sciences. Such relationships contribute to the high standard of excellence which exists in the central California coast and is becoming recognized throughout the Pacific Rim.

MLML's site selection efforts have been fraught with controversy and exorbitant expenses for environmental studies and agency/public review. A new 52,486-square-foot

facility and 90-space parking lot has been proposed on a hilltop overlooking Moss Landing The 17-acre site, owned by the Peterson Trust, has been evaluated for environmentally sensitive resources. Cultural resources have been identified on portions of the property which may be eligible for listing to the National Register of Historic Places. State endangered species are also known to occur in this vicinity. Extensive grading and other associated development actions are proposed.

A key player in the site analysis and selection process is FEMA, who will bear the cost of replacing the majority of the originally destroyed structure. This involvement necessitates that environmental compliance under the NEPA occur. Because of public controversy and opposition by a neighborhood organization known as SMILE, or Save Moss Landing's Indians, Land and Environment, FEMA support for the preferred site has shifted and a detailed Environmental Impact Statement has been ordered.

Early site selection activities and preparation of an Environmental Assessment appear to have lacked a local review of geographic maps or overlays depicting existing environmental constraints. Subsequently, a partial constraints analysis was prepared from information derived from the U.S. Geological Survey. The constraints mapped by the USGS included geological hazards, liquefaction potential, storm hazard and wave erosion, and tsunami run-up areas. Additional overlays considering floodplains, wetlands, cultural resources and noise would have been appropriate early in the process during the selection of alternative sites. Jurisdictional constraints are not an issue in the Moss Landing Harbor area; however, the use of geographic information systems coupled with resource-specific studies may have identified sensitive issues earlier in the process. Likewise, public dissemination of siting needs and environmental information, including mitigation actions, is important for public support and for the consideration of public concerns.

# VII. FINDINGS AND CONCLUSIONS

## Responses to Research Questions

This thesis research considered the effect of a national, regional, and local coastal policies and programs as well as the physical ability to accommodate specific coastal-dependent land uses. Based upon a review of (1) major coastal programs and the identification of coastal stakeholders, (2) the definition of coastal-dependent land use and the existing research, education, and mariculture activities which fit the definition, (3) a review of local coastal programs and policies, and (4) a geographical analysis and overview of siting constraints and opportunities for expanding specific coastal-dependent land use, factors that determine whether coastal-dependent land use can be adequately accommodated within the central California coast were identified.

To help determine whether or not the anticipated proliferation of coastal-dependent and coastal-related land uses associated with research, education, and the protection of marine resources can be adequately accommodated, several research questions were developed. Responses to these questions based upon the above-mentioned research have been prepared along with an assortment of other key findings and conclusions.

Responses to Research Questions

The following questions were posed at the outset of this research and are answered as follows:

1. What factors tend to facilitate coastal-dependent and coastal-related land use within the project area?

Three factors must be considered when assessing whether coastal-dependent and coastal-related land uses can be facilitated: jurisdictional constraints, environmental constraints, and operational constraints. Under jurisdictional constraints, regional and local recognition of state and national priorities relative to coastal-dependent land uses and their supporting coastal-related land uses is needed. Then, a clear coastal-dependent land use policy must be established within each LCP. Each policy must be premised upon a consistent interpretation of the Coastal Act, including the Act's definition of coastal-dependent activities. State, national, and international ramifications of these programs as a whole must be clearly articulated. Public education is also key.

Environmental constraints include those associated with physical landform, such as cliffs, bluffs or geological hazard areas. Special environments such as wetlands, sensitive species habitat, coastal dunes, and prime coastal resource ecosystems are of primary concern. Archaeological, visual, agricultural, and recreational resource values and public coastal access must be considered.

For operational constraints, the primary considerations are the availability of high quality ocean water, direct coastal access, proximity to other coastal research and education institutions, the availability of developable lands within approximately 2,000 feet of the shoreline, and access to harbors for research vessels. Operational constraints can also be tied to the funding of research programs and the availability of coastal-related support services.

2. What types of coastal-dependent land uses are likely to have development opportunities within the study area?

This author believes that coastal-dependent land uses should be clearly and consistently categorized. Those uses that are relatively small, low-impact, or temporary in nature, such as field monitoring and research stations, should consist of one general category. Other uses are those which require larger land areas in order to function. Large research and management facilities include activities requiring over two acres of land area for laboratories, tanks, pumps, pens, equipment and other associated office and classroom space. These coastal-dependent activities should provide for multiple research and education users or tenants. Mariculture represents another category, within which several variations of mariculture facilities and land space needs could be found. For the central coast, mariculture can more readily be accommodated by allowing certain operations to occur within agricultural areas. Once coastal-dependent land use categories have been defined and their function and purpose made more clear to the public and local jurisdiction, then sound policy decisions that appropriately accommodate these uses is more likely to be achieved.

Preferable areas for coastal-dependent research and education activities have already been designated or developed for that specific purpose. The build-out potential on these properties is low. Undeveloped shoreside parcels that will accommodate new uses are few, less than 200 acres within the project area. A moderate demand for properties accommodating these uses exist at the present time. Opportunities may exist in non-prime farmland areas, previously disturbed dune areas, or in underutilized state lands of low habitat quality (e.g., parcels on state beaches isolated by roads or surrounding non-recreational land uses).

3. Considering jurisdictional, environmental, and operational objectives, which areas are most suitable for the coastal-dependent land uses under consideration?

The most suitable areas for new coastal-dependent research and education facilities are Moss Landing, Del Monte Beach in Monterey, Terrace Point in Santa Cruz. Cannery Row is ideal; however, this coastal segment has been effectively built-out to a point where few properties are available which will support new facilities.

From a jurisdictional perspective, suitable site areas can be best identified when using a consistent definition of coastal-dependent land use, particularly where a distinction has been made between categories of such uses. For example, industrial coastal-dependent land use is differentiated from, say, research and education coastal-dependent land uses or from coastal resource monitoring or mariculture. Areas which promote a consistent land use transition between urban and rural boundaries is essential. For coastal-dependent research and education activities, those facilities which are near to other similar activities are preferred, particularly those with reasonable access to a harbor or port. When non-coastal-dependent aspects of a program can be effectively operated away from a coastal site, some operations should be split to accommodate other coastal-dependent operations within the shoreline environment.

4. Do public-private partnerships and collaborative efforts play a key role in the development of coastal-dependent and coastal-related land uses?

Yes, partnerships have been instrumental in advancing marine related research and education, including those which are coastal-dependent. Prime examples include the partnerships forged by NOAA with other governmental and institutional programs. Partnerships are also instrumental in the proliferation of unique and specialized coastal education programs, particularly where universities share facilities and team with other government and institutional endeavors for advancing their curriculum. Examples include

the shared campus facilities at MLML, the joint university and government programs at Hopkins Marine Station and LML, and the anticipated interaction between the new Ft. Ord state university campus and MBARI. Likewise, MBARI will share its seawater system with one or more coastal-dependent education facilities in the Moss Landing Harbor area. Monterey Bay Aquarium already shares its pumped seawater with the adjacent Hopkins Marine Station at Cannery Row.

Partnerships have also been important in supporting mariculture, utilizing lands and pumping facilities at LML, or seawater holding pens at Moss Landing. Still, new relationships need to be sought for the benefit of government programs, industry, and education. For example, mariculture may wish to interact more closely with government programs on new pilot programs or solving common industry issues which may be of interest to resource managers generally. It has been shown that each sector--government, industry, and education--has its own particular strengths and weaknesses. The organizational strengths of government, the creativity of education, and the funding of private organizations and industry should be put to productive use when joined in concert with one another.

5. Can future needs of coastal-dependent/coastal-related land uses be accommodated along a portion of the central California coast?

As of this writing, the answer is "yes." However, several environmental and policy hurdles need to be overcome for this status to be maintained. Provided that local programs use consistent coastal land use policies and guidelines when applying priority status to coastal-dependent developments, and that LCPs consider the greater-than-local importance of many of coastal endeavors, then a methodological approach can be undertaken for accommodating marine-related facilities and programs along the central coast. Also, sites for future and currently proposed facilities can then be determined using a comprehensive

constraints analysis, enabling design and acquisition issues to be less cumbersome or limiting. Projects that have been altered, scaled back, or eliminated due to lack of adequate attention to siting constraints demonstrate the need to prepare a comprehensive analysis, perhaps guided by some of the constraints analysis practices performed here. As industries mature and become more proficient and profitable, and new multi-faceted collaborative efforts materialize within the marine research and education community, an ever greater demand for proper facility siting and design is expected to occur over the next five to ten years.

## Key Findings

While these research questions can be answered from the research performed, other key findings arose during the investigation and include the following:

### Shared Facilities

Collaborative efforts between government, industry, education, and non-profit organizations have been observed by this researcher. These alliances tend to result in either the sharing of existing space and facilities, or relocating together onto new properties.

### Community Investment

Local government should consider community "investment" opportunities via participation in prestigious or visitor-serving coastal-dependent research and education endeavors. Opportunities for improved environmental conditions due to participation in programs connected with regional or national priorities are also directly related to quality-of-life concerns. These may manifest themselves in areas such as improved water quality,

recreational quality, producing premium mariculture products, or by preserving marine species diversity and habitat quality for future enjoyment.

Some Expansion Plans are Tentative

Expansion of coastal-dependent facilities is evolving, but many potential opportunities for growth are tentative due to funding constraints and, most likely, because of environmental, jurisdictional, and operational constraints, as discussed in this report.

Categorize Activities and Utilize Constraints Analysis

Appropriate coastal properties are present, and accommodation of the various coastal-dependent/related expansions can be made, but there is a need to (1) categorize coastal-dependent land uses for planning purposes and (2) apply constraints analysis for proper siting of each coastal-dependent land use category. Constraints analysis should utilize geographic information systems and computerized mapping to the maximum extent possible. The EMIS used by the County of Santa Cruz is one example.

Coproduction

The identification and involvement of interested stakeholders is critical to sound policy and policy implementation. For these stakeholders, Godschalk's "co-production" model must extend beyond state-national government programs and include local interest groups, industry, and the public. Subregional planning issues and concerns must be understood and included with state and national objectives at the local level. A "coproduction" model applied beyond the federal-state levels is necessary for (1) obtaining a sound coastal policy, (2) providing solutions that benefit national as well as local stakeholders, and (3) achieving planning decisions which are comprehensive and holistic in nature.

Coproduction requires linkages between levels of government and other stakeholders. The linkages must be held together by a flow of core values and objectives which are important for sound coastal policy and its implementation. This level of coordination between central and regional/local government must reach a sufficient level in order to resolve conflicts. A series of "nested" or overlapping coastal policies and strategies should exist between the various scales of government, as diagramed on Figure 41. Ways to achieve such a linkage are:

- Clearly understanding the agenda of interested stakeholders and establishing their priorities as part of a long-term continuation of coastal practices, even including localized, short-term goals;
- Placing local government, planners, and citizens within the process of formulating broader policies (shared governance);
- Providing technical assistance and increased institutional capacity via the placement of well-trained coastal managers and scientific professionals into coordinating and advising roles within all planning levels;
- Infusing a long-term, greater-than-local perspective into the community and encouraging the concept of shared responsibility and stewardship;
- Increasing local area knowledge and expertise via public outreach and education, such as teaching the national implications of local actions;
- Seeking ways to improve and empower local communities, such as improved education, expanded opportunities, and providing direct and indirect economic benefits;
- Exposing the external costs of each action and ensuring that a mitigating measure or remedy is undertaken.

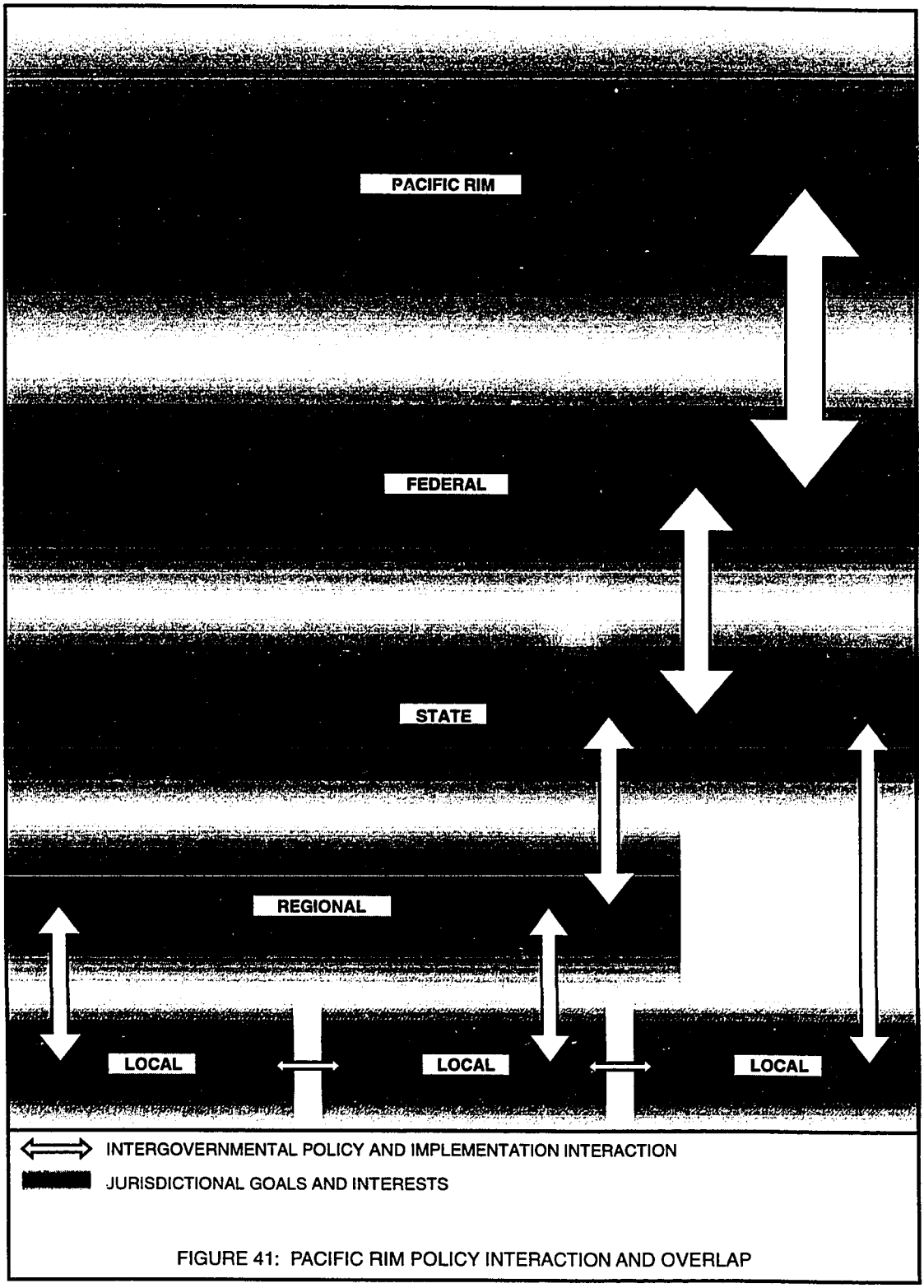



FIGURE 41: PACIFIC RIM POLICY INTERACTION AND OVERLAP

## Recommended Actions

Based on the conclusions made from this research, several specific actions are recommended:

- To foster collaboration, the leadership role of NOAA and CCC in the coordination of partnerships should be expanded. Organizations and committees, such as the Research Activity Panel associated with the MBNMS office should be strengthened.
- Non-profit and community outreach programs associated with government programs, such as the MBNMS activities, should be well coordinated, focused, and actively pursued at the local level. One organization is Save Our Shores, which has proposed the organization of over 20 volunteers to act as "sanctuary stewards."
- Similar funding should be sought from other area-wide institutions. In addition to the $200,000 given to LML last year, the David and Lucille Packard Foundation has recently given UCSC $1 million to form an endowment for funding projects between outside researchers, UCSC scientists, and undersea researchers at MBARI.
- The Sea Grant Program, which funds research and education at coastal-dependent facilities at Moss Landing at other locations, should be expanded, perhaps with the aid of industry or non-profit visitor-serving entities such as the Monterey Bay Aquarium.
- An interagency council or taskforce for the orderly growth, collaboration, and funding of coastal-dependent research and education should be funded.

- Interagency Memoranda of Agreement or Memoranda of Understanding should be prepared among federal, state, and local governments to facilitate the flow of policy and its implementation between various levels of government.

## Recommended Research

From the research performed to date, several issues and topics can be identified that are deserving of further study. The three topics that appear to have the greatest need for further investigation are as follows:

- An investigation of the primary (e.g., water quality and public use areas) and secondary (e.g., building heights and traffic) coastal concerns that occur at the local level of government and how these concerns can be considered under national or state coastal programs. This information is critical when establishing a long-term continuum of collaborative coastal programs between local, regional, and federal jurisdictions. Amendments to many LCPs may be in order.
- A structured, academic review of local coastal programs is needed to compare how well each has interpreted and implemented the other objectives contained within the California Coastal Act (i.e., coastal access or recreation opportunities). By comparing programs approved early in the life of the Coastal Act with those approved more recently, the level of inconsistency between the programs can be gauged. Such inconsistencies make some areas more prone to accommodating only particular types of coastal development, and in some cases certain localities may be found to be overly dependent upon a single coastal land use.

- The use of geographic information systems to characterize coastal resources and coastal lands for future planning and for accommodating land uses that must function near the shore. GIS is being initiated at various governmental levels; however, a comprehensive approach is needed to understand regional relationships between natural resources; urban growth and development; land, air and water pollution; and economic trends within the coastal zone.

# LIST OF REFERENCES

Ames, Jack, Environmental Specialist, California Department of Fish and Game. 1995. Interview by author, 12 January, Monterey, CA.

Anderson, Brian, Associate Specialist, Granite Canyon Research Laboratory. 1995. Interview by author, 19 January, Carmel, CA.

Armstrong, John M., Peter C. Ryner. 1981. Ocean Management - A New Perspective. Ann Arbor, MI: Ann Arbor Science Publishers, Inc.

Asher, Herbert B. 1988. Polling and the Public: What Every Citizen Should Know. Washington, D.C.: CQ Press.

Barbaro, Kathy, Planning Director, City of Capitola. 1995. Interview by author, 30 January, Capitola, CA.

Beatley, Timothy, David J. Brower, and Anna K. Schwab. 1994. An Introduction to Coastal Zone Management. Covelo, CA: Island Press Publishers.

Bender, Norman K. 1994. Addressing Coastal Issues Though Educational Collaborations and Partnerships. In The Coast: Organizing for the Future: Proceedings of the Fourteenth International Conference of The Coastal Society held in Charleston, SC 17-21 April 1994, edited by Thomas E. Bigford, 9-15. Gloucester, MA: The Coastal Society.

Bernstein, Brock B., Bruce E. Thompson, and Robert W. Smith. 1993. A Combined Science and Management Framework for Developing Regional Monitoring Objectives. Coastal Management 21: 185-195.

Bigford, Thomas E. 1994. NOAA's Efforts in Watershed and Ecosystem Management. In The Coast: Organizing for the Future: Proceedings of the Fourteenth International Conference of The Coastal Society held in Charleston, SC 17-21 April 1994, edited by Thomas E. Bigford, 21-25. Gloucester, MA: The Coastal Society.

Boesch, Donald F. 1994. Translation of Science to Policy: Notes from a Ghostbuster. In The Coast: Organizing for the Future: Proceedings of the Fourteenth International Conference of The Coastal Society held in Charleston, SC 17-21 April 1994, edited by Thomas E. Bigford, 27-29. Gloucester, MA: The Coastal Society.

Bowden, Gerald D. 1982. Coastal Aquaculture Management Issues. In Collection of Papers presented at the Ocean Studies Symposium held in Asilomar, CA 7-10 November 1982, compiled by the California Coastal Commission and the California Department of Fish and Game, 1984 (March): 83-90.

Boyle, Keith, Associate Planner-City of Santa Cruz. 1995. Interview by author, 19 January, Santa Cruz, CA.

Brown, Dail W. 1994. From Practice to Policy: Working Together. In The Coast: Organizing for the Future: Proceedings of the Fourteenth International Conference of The Coastal Society held in Charleston, SC 17-21 April 1994, edited by Thomas E. Bigford, 33-39. Gloucester, MA: The Coastal Society.

Bryant, Beth C. 1993. The Regional Marine Research Program (RMRP): A New Approach to Marine Research Planning. Coastal Management 21(3): 327-332.

California Coastal Commission. 1993. California Coastal Act of 1976 - As of January 1993. San Francisco, CA: Public Information Office.

California Coastal Conservancy. 1991. Pillar Point Harbor Master Plan & Urban Waterfront Restoration Plan. Oakland CA: Callander Associates.

California Regional Water Quality Control Board. 1989. Water Quality Control Plan--Central Coast Region (Region 3). Resolution No. 89-04.

California Regional Water Quality Control Board. 1993. Water Quality Control Plan for Enclosed Bays and Estuaries of California. Resolution No. 92-100.

California Water Resources Control Board. 1993. Status of the Bay Protection and Toxic Cleanup Program--Staff Report. Sacramento, CA: Bay Protection and Toxic Cleanup Program.

Cardellino, Joan, Planner-Coastal Conservancy. 1995. Interview by author, 19 January, Oakland, CA.

Chabot and Associates. 1989. Central Coast OCS Regional Studies Program. San Francisco, CA: Chabot and Associates.

Chui, Glennda. 1994. Lab's Search for a Home is Snagged. San Jose Mercury News, 5 March, 4B.

Cicin-Sain, Biliana. 1990. California and Ocean Management: Problems and Opportunities. Coastal Management 18(3): 311-335.

City of Monterey. 1981. Cannery Row Local Coastal Program Land Use Plan. Monterey, CA: Monterey City Council.

City of Monterey. 1987. Monterey Harbor Local Coastal Program Land Use Plan. Monterey, CA: Monterey City Council.

City of Monterey. 1992a. Skyline Local Coastal Program Final Land Use Plan. Monterey, CA: City of Monterey Community Development Department.

City of Monterey. 1992b. Del Monte Beach Local Coastal Program Revised Land Use Plan. Monterey, CA: Monterey City Council.

City of Monterey and City of Seaside. 1981. Land Use Plan for the Laguna Grande/Roberts Lake Local Coastal Program. Monterey, CA: Monterey City Council, and Seaside, CA: Seaside City Council.

City of Santa Cruz. 1992. General Plan and Local Coastal Program 1990-2005. Santa Cruz, CA: Santa Cruz City Council and General Plan Staff.

Clarke, J. J. 1991. Regional Coastal Planning and Regulation: The Cape Cod Experience. Coastal Zone '91. New York, NY: American Society of Civil Engineers.

Conley, Gail. Environmental Management Information System Coordinator-County of Santa Cruz. 1995. Interview by author, 5 January, Santa Cruz, CA.

Conte, F.S., and A.T. Manus. 1982. Aquaculture and Coastal Zone Planning. In Collection of Papers presented at the Ocean Studies Symposium held in Asilomar, CA 7-10 November 1982, compiled by the California Coastal Commission and the California Department of Fish and Game, 1984 (March): 116-137.

Corlay, Jean-Pierre. 1993. Coastal Wetlands: A Geographical Analysis and Some Projects for Management. Ocean & Coastal Management 19: 17-36.

County of Monterey. 1984. Carmel Area Land Use Plan/Local Coastal Program. Salinas, CA: Monterey County Board of Supervisors.

County of Monterey. 1986. Big Sur Coast Land Use Plan/Local Coastal Program. Salinas, CA: Monterey County Board of Supervisors.

County of Monterey. 1988. Monterey County Coastal Implementation Plan - Part 1. Salinas, CA: Monterey County Board of Supervisors.

County of Monterey. 1993. North County Land Use Plan Update Local Coastal Program - Final Draft. Salinas, CA: Monterey County Board of Supervisors.

County of Santa Cruz. 1994. General Plan and Local Coastal Program for the County of Santa Cruz, California. Santa Cruz, CA: Santa Cruz County Planning Department.

Crawford, Brian R., J. Stanley Cobb, and Abigail Friedman. 1993. Building Capacity for Integrated Coastal Management in Developing Countries. Ocean & Coastal Management 21: 311-337.

Curley, S. 1990. Texas Coastal Plan: Analysis of a Failure. Coastal Management 18: 1.

Dornbusch, David M. 1994. A Review of Existing Information on Recreational Boating Activity and its Potential Impacts on the Resources of the Monterey Bay National Marine Sanctuary. San Francisco, CA: David M. Dornbusch & Company.

Early, Steve, Graphics Supervisor-County of Monterey Planning and Building Inspection Department. 1995. Interview by author, 19 January, Salinas, CA.

Edwards, Brian, Geologist-United States Geological Survey, Branch of Pacific Marine Geology. 1993. Interview by author, 9 March, Palo Alto, CA

Farr, Sam. 1990. Central Coast Marine Science Research Directory. Santa Cruz, CA: California State Assembly.

Fell, William, Director of Advanced Planning-City of Monterey. 1994. Interviewed by author, 18 December, Monterey, CA.

Finnell, Gilbert L. 1985. Intergovernmental Relationships in Coastal Land Management. Natural Resources Journal 25: 1.

Folke, Carl. 1992. Aquaculture with its Environment: Prospects for Sustainability. Ocean & Coastal Management 17: 5-24.

Galasso, George A. 1993. Monterey Bay National Marine Sanctuary Water Quality Management: The Use of Coordinating Mechanisms. Coastal Management 21: 333-345.

Godschalk, David R. 1992. Implementing Coastal Zone Management: 1972-1990. Coastal Management 20: 93-116.

Grenell, Peter. 1988. The Once and Future Experience of the California Coastal Conservancy. Coastal Management 16: 13-20.

Griggs, Gary B. 1994. Monterey Bay - A National Center for Marine Science. Santa Cruz, CA: University of California, Santa Cruz, Institute of Marine Sciences. Photocopied.

Griggs, Gary, Director-Institute of Marine Sciences, UCSC. 1995. Interview by author, 6 January, Santa Cruz.

Hendrickson, Hank, Executive Dean-California State University, Monterey. 1995. Interview by author, 23 January, Monterey, CA.

Hildreth, Rick, and Leigh Parker. 1988. Long Lab Celebrates a Decade of Research. Good Times, 29 September, 7.

Hildreth, Richard G. 1994. The Roles of Science in U.S. Marine Policy: Some Regional Applications. In The Coast: Organizing for the Future: Proceedings of the Fourteenth International Conference of The Coastal Society held in Charleston, SC 17-21 April 1994, edited by Thomas E. Bigford, 121-127. Gloucester, MA: The Coastal Society.

Huffman, James L. 1991. Truth, Purpose, and Public Policy: Science and Democracy in the Search for Safety. Environmental Law 21: 1091-1107.

Jarvis, Michela. 1989. The California Coastal Commission: The Beleaguered Guardians of California's Coast. California Journal (October): 403-406.

Kenchington, Richard, and David Crawford. 1993. On the Meaning of Integration in Coastal Zone Management. Ocean & Coastal Management 21: 109-127.

Ketchum, Bostwick H. 1972. The Water's Edge - Critical Problems of the Coastal Zone. Boston, MA: MIT Press.

Knecht, Robert W., and Jack Archer. 1993. 'Integration' in the U.S. Coastal Zone Management Program. Ocean & Coastal Management 21: 183-199.

LSA Associates, Inc. 1994. Environmental Assessment: Moss Landing Marine Laboratories. Monterey, CA: California State University.

Maki, Steven, Senior Planner-County of Monterey. 1994. Interview by author, 21 December, Salinas, CA.

Mangone, Gerard J. 1988. Marine Policy for America. 2d ed. New York, NY: Taylor and Francis Publishing Company.

McCarthy, Maurice M., and Gilbert Sylvia. 1994. A Comparative Analysis of Mariculture Policy in Western Nations. In The Coast: Organizing for the Future: Proceedings of the Fourteenth International Conference of The Coastal Society held in Charleston, SC 17-21 April 1994, edited by Thomas E. Bigford, 193-197. Gloucester, MA: The Coastal Society.

Mitchell, J.K. 1986. Coastal Management Since 1980: The U.S. Experience and its Relevance for other Countries. Ocean Yearbook (1986): 319-345, Chicago, IL: University of Chicago.

Moore, Terry, and Arthur C. Nelson. 1993. Case Study of the Effectiveness of Coastal Growth Management in a Growth Management State. Coastal Management 21: 197-208.

Oliver, John S., Marine Ecologist-Moss Landing Marine Laboratories. 1995. Interview by author, 6 January, Salinas, CA.

Owens, David W. 1992. National Goals, State Flexibility, and Accountability in Coastal Zone Management. Coastal Management 20: 143-165.

Petre, David, Realty Specialist-NOAA, Western Administrative Support Center. 1994. Interview by author, 21 February, Seattle, WA.

Phoebus, Ronald, Chief Financial Officer-Monterey Bay Aquarium Research Institute. 1995. Interview by author, 31 December, Monterey, CA.

Quarnstrom, Lee. 1991. Santa Cruz May Get Oil-Spill Rescue Center. San Jose Mercury News, 29 January, 1B.

Rosener, J. B. 1980. Intergovernmental Tension in Coastal Zone Management: Some Observations. Coastal Zone Management Journal 7: 95.

Scravini, Peter, Owner-Pacific Mariculture. 1995. Interview by author, 19 January, Davenport, CA.

Thompson, Judy, Administrator-Hopkins Marine Station. 1995. Interview by author, 31 January, Pacific Grove, CA.

Topp, Catherine. 1994. Kelp Forests. Sanctuary Watch. December 1994 (1-94): 4.

Turner, R. Eugene, and Jerry R. Schubel. 1994. Research and Development Funding for Coastal Science and Management in the United States. In Proceedings of a Retreat Held at the J. Erik Jonsson Woods Hole Center Held in Woods Hole, MA 25-26 June 1992, by the Commission on Geosciences, Environment, and Resources, National Research Council. Washington, DC: National Academy Press, 155-164.

U.S. Department of Commerce. 1977. State of California Coastal Management Program and FEIS. Washington, DC: NOAA Office of Coastal Zone Management

U.S. Department of Commerce, NOAA. 1991a. Assessing Non-point Source Pollution in Coastal Areas: NOAA's Current and Future Capabilities. Silver Spring, MD: NOAA/NOSS SEA Division, N/ORCA1.

U.S. Department of Commerce, NOAA. 1991b. The Monterey Bay Connection: A Prospectus for NOAA's Scientific Excellence--FY 1992-1995. Seattle, WA: NOAA Strategic Planning Staff.

U.S. Department of Commerce, NOAA. 1991c. NOAA Administrative Handbook. Organization Code ND000, Silver Spring, MD: Government Printing Office, February 28, 1991.

U.S. Department of Commerce, NOAA. 1992a. Monterey Bay National Marine Sanctuary Final Environmental Impact Statement/Management Plan, Volume I. Washington, DC: Sanctuaries and Reserves Division.

U.S. Department of Commerce, NOAA. 1992b. Request for Information-Tiburon Laboratory. Seattle, WA: NOAA, Office of Administration, Western Administrative Support Center.

U.S. Department of Commerce, NOAA. 1993. Scientific Research Plan for the Monterey Bay National Marine Sanctuary. Prepared by the Monterey Bay National Marine Sanctuary Research Advisory Committee, National Ocean Service, Office of Ocean and Coastal Resource Management, Sanctuaries and Reserves Division, September 1993.

Wilder, Robert J. 1993. Is This Holistic Ecology or Just Muddling Through? The Theory and Practice of Marine Policy. Coastal Management: 209-224.

Williams, Steven, Program Director, Mapping-Association of Monterey Bay Area Governments. 1994. Interviewed by author, 21 December, Santa Cruz, CA.

Young, Oran R. 1989. Science and Social Institutions: Lessons for International Resource Regimes. In International Resource Management: The Role of Science and Politics, ed. Steinar Andresen and Will Østreng. London: Bellhaven Press.

# APPENDIX A

# CONSTRAINTS ANALYSIS

## Santa Cruz County
## North Coast Segment

General Description

The North Coast Segment begins at Big Basin Redwoods State Park and continues south to Davenport. It consists largely of high, rugged coastal cliffs and bluffs with broad agricultural terraces along most points. The predominate land uses are agriculture, park and recreation land, with occasional residential and commercial.

Jurisdictional Constraints

Except for portion of the coast adjacent to Davenport, the vast majority of coastal property between State Highway 1 (Route 1) and the coast is designated as "Existing Parks and Recreation" or "Agriculture." One short lateral strip of coast approximately one-quarter mile long is designated "Mountain Residential." This property is immediately north of the north Swanton Road intersection with Route 1. In view of the competing priority uses, specifically existing parks, recreation, and agriculture, the opportunity for all but a few mariculture operations and small-scale basic research and resource monitoring activities to be deemed compatible in this segment is extremely low. Mariculture is allowed in "Agriculture," "Mountain Residential," and "Service Community" designations if consistent with LCP policy and is buffered from sensitive habitats and unstable slopes. One current example of mariculture, Pacific Mariculture, is located near Davenport.

Environmental Constraints

The project area begins at the coastal portion of the Big Basin Redwoods State Park, which is strictly reserved for recreational and natural resource preservation activities. In addition, the entire Route 1 and many adjacent areas are designated as a Scenic Road and Highway (as is the case throughout the entire project area). Sheer cliffs and unstable slopes are present along much of the North Coast segment, especially along Route 1 at Waddell Creek. Bluffs range in height from 45 feet to over 150 feet along this coastal segment, making direct access and pumping of seawater problematic. The many scenic vistas along the coastal and inland from Route 1 would restrict the location, size, and architectural design options for any development including agriculturally related structures associated with mariculture. Much of the agricultural land is considered prime farmland and would be excluded from development plans that would displace this land use.

Operational Constraints

There are likely to be severe restrictions to large research laboratory, office, and educational facilities. This is due to the lack of non-recreational and non-agricultural land present. In

addition, cliffs and bluffs prevent direct access to the coast which results in an operational constraint to many research, resource monitoring, and seawater extraction activities. Some Basic Research and Education operations, including remote monitoring of rookeries and haul-out zones, are possible. Mariculture that does not require direct access to the sea, may be accommodated near commercial/agricultural areas near Davenport. Potential areas were identified for these types of endeavors.

North Coast Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | +/- | + | - |
| Environmental | +/- | + | +/- |
| Operational | +/- | + | - |

North Coast Site Area Identification Summary

| Site Number | Potential Acreage | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|---|
| 1 | ~20 | 2 | 2 | 16 |

Site Description

- Site 1 is a parcel near beach level at Davenport Landing currently used for storage and land moorings.
- Site 1 is atop of the coastal terrace adjacent to the commercial zone at Davenport and is currently zoned for agriculture.

# CONSTRAINTS ANALYSIS

## Santa Cruz County
## Bonny Doon Segment

General Description

This segment lies between Davenport and the western city limit at Santa Cruz. The segment consists predominantly of agricultural land uses with areas for parks and recreation interspersed along the coastal strip. Cliffs area present but not as high as that of the North Coast segment (typically less than 80 feet).

Jurisdictional Constraints

Jurisdictional designations are primarily Agriculture and Park and Recreation; however, a coastal parcel designated Resource Conservation is located near the Arroyo Laguna watershed near Route 1, and another Mountain Residential polygon extends from Route 1 almost to the coastline between Needle Rock Point and Terrace Point. Park and Recreation designations include coastal portions of Wilder Ranch State Park, which may accommodate very limited amounts of Mariculture and Applied Research and Management activities, but less than approximately three acres due to adjacent natural park lands and sloped areas. Development would be generally restricted to existing farm structure and visitor-serving infrastructure and parking areas. Mariculture operations may have greater siting opportunities within the Agricultural designations, possibly adjacent to the residential area mentioned above.

Environmental Constraints

Steep slopes, scenic vistas, prime agriculture, and existing park land are the major environmental constraints to coastal-dependent or coastal-related land development within this coastal segment.

Operational Constraints

Seawater intake, pumping, and outfall sites are more feasible along this portion of coast as compared to the North Coast segment. Cliff areas can be found that are relatively short and coastal access is more frequent. Coastal terraces do allow space for development, such as facilities required by larger Applied Research and Management coastal-dependent land uses. However, existing access and utility infrastructure is limited, and the area generally lacks areas of wide interest to marine researchers overall, such as large estuaries or prime haul out areas. The region is also somewhat removed from existing facilities or marine-related organizations, hence this area is not conducive to collaborative efforts with other facilities.

Bonny Doon Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | +/- | + | +/- |
| Environmental | +/- | +/- | - |
| Operational | + | + | - |

Site Area Descriptions

- No sites were identified. A property located within Wilder Ranch would be confined to existing buildings and parking. Another property along the coastal agricultural bluff south of a Mountain Residential region, between Needle Rock Point and Terrace Point is extremely isolated.

## CONSTRAINTS ANALYSIS

### Santa Cruz County
### City of Santa Cruz Segment

General Description

Coastal environments within the City of Santa Cruz have been largely built-out and zoned for uses such as visitor-serving enterprises, residential housing, and park and recreation land. Coastal-dependent fishing and boating facilities and supporting operations are located at either the Santa Cruz Wharf or the Santa Cruz Harbor. Under the City's General Plan, areas suited to coastal-dependent land uses were designated during the mid-1980s and are articulated in the most recent LCP submitted to the CCC. The primary coastal-dependent land designation by the City is at the Terrace Point property and the adjacent area at UCSC's Long Marine Lab.

Jurisdictional Constraints

The City of Santa Cruz defines coastal-dependent and coastal-related land use more broadly than that found in the Coastal Act. The LCP defines coastal-dependent industries as "marine research and education, agriculture, aquaculture, mariculture, and attendant facilities that require direct proximity to the ocean." A definition of "attendant" facilities requiring direct "proximity" to the ocean is open to interpretation. The City addresses the need for consistent policies regarding coastal-dependent development and industry, including the designation and siting of land use categories that may fall within their definition of "coastal-dependent." Orderly and balanced development is sought so that the type, pattern, and phasing of development is consistent with environmental constraints, public services and utilities, coastal access priorities, and surrounding parcel size utilization. The need to have a smooth transition between the urban and rural boundaries is important, particularly for properties such at Terrace Point.

Environmental Constraints

Environmental constraints are restricted those natural resources present on developable properties near the coast. For Santa Cruz this involves consideration of wetlands, prime farmlands, endangered species habitat, coastal water quality and shoreline habitats. Erosion of exposed coastal cliffs which form broad coastal terraces, particularly on the west side of Santa Cruz is also critical. Constraints related to zoning compatibility, visual impacts, traffic and circulation, and shoreline access are considered within the context of either their jurisdictional or operational aspects. Undeveloped or under utilized property at Lighthouse Point is set aside for parks, recreation, and open space. Property at the Yacht Harbor is built-out with little space for a coastal-dependent research and educational facility to function to full capacity.

Operational Constraints

Operational constraints associated with coastal-dependent and coastal-related activities proposed within the City relate to adequate water quality, access to coastal seawater, space for multiple coastal-dependent users and their facilities, and real estate costs. Within the City of Santa Cruz, few areas other than the Terrace Point property satisfy each of these operational constraints.

City of Santa Cruz Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | - | - | - |
| Environmental | +/- | +/- | +/- |
| Operational | + | + | + |

City of Santa Cruz Site Area Identification Summary

| Site Number | Potential Acreage | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|---|
| 2 | 40 | 5 | 25 | 10 |

Site Area Descriptions

- The Terrace Point property adjacent to Long Marine Laboratory has been identified as a primary location for accommodating additional coastal-dependent land use and development.

## CONSTRAINTS ANALYSIS

### Santa Cruz County
### Live Oak Segment

General Description

This coastal segment lies between the City of Santa Cruz city limit located adjacent to the yacht harbor and the City of Capitola city limits. The coastal region is largely unincorporated, urbanized lands within the County's jurisdiction. Land uses are typically recreational and residential along the coastal fringe.

Jurisdictional Constraints

Jurisdictional designations in this segment are primarily coded as Parks and Recreation. This includes beaches and cliffs, as well as adjacent lakes and sloughs. Beyond the immediate coastal strand are high, medium, and low density residential areas with intervening urban open space and drainages into coastal sloughs. Commercial areas and visitor-serving areas are generally set away from the immediate 1,000 feet of the coast within this segment. A single parcel of approximately 1 acre is adjacent to the coast near 20th Avenue and is designated as a "Public Facility."

Considering the intensity of residential buildout in this coastal segment and the preponderance of various recreation-related opportunities, the potential for filling parcels which are either vacant or contain substandard structures is generally low. Siting opportunities are limited and may not be considered compatible with existing land use objectives within this urbanized area.

Environmental Constraints

The main environmental constraints are the presence of erodible cliffs, shoreline wetlands, lagoons, and beach area ecosystems. Most upland sites have been built upon. Generally, lagoon and coastal lakes are stagnant and do not flow into the ocean except during exceptional storm events.

Operational Constraints

The lack of developable space generally deters most large-scale Applied Research and Management coastal-dependent land uses and most mariculture operations. No piers or large estuary environments are present to attract such land uses. Access to seawater is limited by existing land uses and water quality is altered by episodes of sewage treatment overflow occurring directly into the Bay. Prime marine habitat of greater than local interest is generally absent. A single parcel at Corcoran Lagoon, which is isolated from the beach

by East Cliff Drive, may be appropriate from some Basic Research and Education uses only.

Live Oak Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | +/- | + | + |
| Environmental | + | + | + |
| Operational | + | + | + |

- No sites were identified. A single parcel designated as Public Facility is restricted by adjacent single-family residential housing. Another property adjacent to Corcoran Lagoon is isolated from the beach and normal tidal action by East Cliff Drive.

## CONSTRAINTS ANALYSIS

### Santa Cruz County
### City of Capitola Segment

General Description

This coastal segment lies entirely within the City of Capitola, between Live Oak and New Brighton State Beach. The coastal region is largely unincorporated urbanized lands within the County's jurisdiction. Land uses along this short segment are predominantly visitor-serving and residential along the coastal fringe.

Jurisdictional Constraints

The City of Capitola does not have any properties specifically designated as coastal-dependent or coastal-related. The majority of uses are visitor-serving and residential, with a significant amount lateral coastal area subject to steep cliffs and severe erosion. Few areas were identified which would support a research, education, or mariculture facility. In as much as visitor information and educational displays are coastal-related, such a facility would be congruent with selected visitor-serving endeavors or public facilities. No specific locations were identified for this purpose and none were suggested at this time (Barbaro 1995).

Environmental Constraints

Environmental constraints for this segment are associated with riparian areas adjacent to Soquel Creek, cliff erosion, and archaeological and paleological resources known to exist on and within the exposed bluffs, as shown on resource maps located at the City of Capitola Planning Department. Natural resources and recreational opportunities within the New Brighton State Beach would be compromised, judging from the limited land space for these uses, if further development was to occur at this state property.

Operational Constraints

Potentially available non-residential properties that would allow direct coastal access or use are not apparent. No existing coastal-dependent research, education or mariculture is present. Kelp beds are present offshore and may be appropriate for kelp harvesting; however, no suitable harbor or land-based operating locations within this coastal segment would economically accommodate this seasonal practice.

City of Capitola Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | +/- | + | + |
| Environmental | + | + | + |
| Operational | + | + | + |

Site Area Descriptions

- No sites identified.

## CONSTRAINTS ANALYSIS

### Santa Cruz County
### Aptos Segment

General Description

This coastal segment consists of a continuous coastal strand with occasional residential dwellings and public facilities set near sea level against a low coastal bluff. The segment extends from New Brighton State Beach to Rio Del Mar, inclusive.

Jurisdictional Constraints

State properties designated for Parks and Recreation are present throughout the immediate coastal strip; however low to very low density residential development lies above the coastal bluffs and within approximately 2,000 feet of the shore. At least two parcels within this segment could accommodate coastal-dependent activities, except for certain intensive on-shore marine resource monitoring and mariculture activities. The tracts are near enough to the shore to utilize seawater pumping facilities and, therefore, could accommodate laboratories, aquariums, and land-based holding pens and pools for marine mammals. The parcels do not appear to be within a recreational area.

Environmental Constraints

Specific areas are present which have unique recreational opportunities and established facilities; for example, Seacliff State Beach's "cement boat." These state lands may not be altered under virtually every circumstance. The installation of shoreline infrastructure, such as surface intake/discharge pipes, groins, or other structures would be detrimental to lateral sand distribution and down current beach retention. Submerged intake/outfall for seawater may be possible if properly designed. Cliff protection and armor is often required for developments near the top or bottom of coastal bluffs. Upper terrace locations must consider habitat encroachment and erosion. Agriculture is present on parcels further inland and at the extreme southeast portion of the coastal segment. Erosion of cliffs and bluffs is a hazard often requiring slope retention and armoring.

Operational Constraints

Direct coastal access would be limited by cliffs and existing development in some areas. Parcels on the coastal terrace are possible given a stable slope condition and use of an underground water conveyance system that does not affect shoreline park lands, private property, and seasonal sand or dune migration. Collaboration with other research centers would be available in the immediate vicinity; however, extensive facilities would draw collaborative efforts to a selected site if such development is deemed feasible. Water quality is considered to be only moderate due to the proximity to municipal outfall pipes

offshore and up-current from this portion of the coast. Within a direct source of sea water intake, mariculture would be ideal in this area of mixed agricultural, residential, and open space land uses.

Aptos Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | +/- | - | +/- |
| Environmental | + | +/- | +/- |
| Operational | + | - | - |

Aptos Site Area Identification Summary

| Site Number | Potential Acreage | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|---|
| 3 | 20 | 0 | 15 | 10 |
| 4 | 15 | 0 | 10 | 0 |

Site Area Descriptions

- Sites 3 and 4 are separate adjacent parcels located within large, open area above the Seacliff State Beach coastal bluffs. They are undeveloped and are used for either agriculture or open space. Neither are contiguous with the coastline.

## CONSTRAINTS ANALYSIS

### Santa Cruz County
### La Selva Segment

General Description

This coastal segment is situated roughly between Rio Del Mar and Manresa State Beach. It includes a laterally continuous sandy beach. Immediately inland are low coastal bluffs and erodible slopes with undulating terraces above. Level areas atop of the coastal terraces are used for very low density housing, agriculture, and urban open space. Beach areas mostly lie within state designated beaches and parks; hence, little opportunity for development of facilities of any type are permitted within these areas. However, land transfers and easements are possible within such areas upon approval by the appropriate managing agencies.

Jurisdictional Constraints

Small tracts and single residential developments are present in widely spaced areas within this segment. Other areas are designated as agriculture or urban open space, all of which may accommodate coastal-dependent land uses located near marine resources. Some evaluation and further considerations would be required in order to locate offices and conference space associated with some coastal-dependent research and education, particularly in an area containing low density development. Traffic, noise, and aesthetic issues would need to be addressed, along with other natural environmental considerations. Jurisdictional designations for land within this segment does not specifically single out coastal-dependent land uses, principally due to the lack of such uses historically, and a reliance on agricultural revenue.

Environmental Constraints

Natural areas would need to be assessed for endangered species, and agricultural properties reviewed for prime farmland status. Seawater intake/outfall would need to be designed to eliminate major impacts upon cliffs, beaches, and marine life. The presence of state beaches and associated facilities does present a potential for significant impacts to recreation opportunities in natural areas. Previously undiscovered archaeological resources may be present within large, undeveloped tracts on coastal terraces. Last, the environmental effect of providing the necessary utilities and supporting coastal-related facilities (i.e., cumulative effects) may be restrictive within this segment.

Operational Constraints

Operational constraints are those associated with the need for high-quality seawater, issues associated with the planning and placement of water intake pipes and pumping facilities,

and the need to collaborate with other institutions and organizations in close proximity to a coastal-dependent facility. Mariculture operations requiring direct ocean access for the propagation or growth of their products would not be feasible. Others requiring only pumped or imported seawater may be possible. All these operational concerns represent a serious challenge to coastal-dependent development within this coastal segment.

La Selva Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | +/- | + | +/- |
| Environmental | +/- | +/- | +/- |
| Operational | +/- | +/- | +/- |

La Selva Site Area Descriptions

- No sites were identified.

## CONSTRAINTS ANALYSIS

### Santa Cruz County
### San Andreas Segment

General Description

This coastal segment extends from Rio Del Mar to the Santa Cruz-Monterey county line. Sunset State Beach is located along the majority of this coastal strip. The segment is comprised of laterally uninterrupted sandy beach with few areas for direct vehicular access via primary or secondary roadways. Immediately away from the coastal strip are agricultural plots with several interspersed areas of low density residential development. Low cliffs and the county line formed by the Pajaro River are at the extreme southern end of this coastal segment.

Jurisdictional Constraints

Residential segments are relatively small, well-established tracts that lack space for further significant development. Some displacement of open space or less productive agricultural plots would be necessary for any future development. A determination of prime farmland and sensitive wildlife habitat would be required in these areas. County policies regarding development on agricultural land and limited open space areas would be prohibitive unless adequately compensated for or otherwise mitigated. Underutilized or lower priority land use areas controlled by the State of California for public beaches and parkland may become available; however, this land use constraint is generally quite severe.

Environmental Constraints

Environmental issues associated with natural resources include the displacement of natural recreation areas and beaches. The contiguous strand of sandy beach within this segment is a protected amenity that would tend to restrict siting of coastal facilities. Significant terrestrial flora and fauna habitat are present, as are occasional sand dune formations and their habitats. Appropriate engineering and designs for small or custom-scale projects requiring seawater access and use of state property, agricultural tracts, or open space may be allowed, but is likely to be economically prohibitive. Several properties may be developable, provided that operational and jurisdictional constraints are addressed in an environmentally responsible manner.

Operational Constraints

Due to the proximity of this segment to the mouth of the Pajaro River, local water quality near the shoreline is poorly suited for coastal-dependent research, education, and mariculture facilities. The Pajaro River carries large quantities of debris, silt, sediment, and agricultural runoff (which likely include elevated levels of pesticides). Plumes of silt enter

the Monterey Bay each day, and is particularly severe during the river's high flow periods during the winter and spring months. Few viable opportunities for applied research and management of marine resources are present, and mariculture operations may be limited by the fluctuation of both water quality and water flow. Coastal-dependent activities categorized as basic field research and education may have greater opportunities in this area, where they might address human impacts due to human alteration of marine habitat, agricultural runoff, and coastal interactions.

San Andreas Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | +/- | + | + |
| Environmental | +/- | + | + |
| Operational | +/- | + | + |

San Andreas Site Area Identification Summary

| Site Number | Potential Acreage | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|---|
| 5 | 10 | 5 | 5 | 0 |

Site Area Description

- Site 5 is also on state land three-quarters of a mile south of West Beach Road, on an isolated tract between the Watsonville Slough to the east and a narrow residential tract to the west.

## CONSTRAINTS ANALYSIS

### Monterey County
### North County Segment

General Description

This coastal segment encompasses approximately nine miles of shoreline located immediately south of the Santa Cruz-Monterey county line. Over 90% of the segment is designated as either California state beach and wildlife area. Numerous sloughs and rivers meet the ocean along this segment, usually after some form of man-made alteration for agriculture, development, or infrastructure. Agriculture is the most common land use immediately inland of the coastal strand, where many areas of prime or unique farmland soils are present. The Moss Landing Harbor area is set within the segment but is analyzed separately using the Moss Landing Community Land Use Plan.

Jurisdictional Constraints

The State of California has jurisdiction along the coastal portion of this segment. Zmudowski State Beach, Moss Landing State Beach, Salinas River State Beach and the Salinas River Wildlife Area are all contiguous (except with the Moss Landing Harbor segment) within the North County coastal segment. In addition to the recreation and preservation policies of the California Department of Parks and Recreation, extensive slough and riverine areas have been purchased by various agencies and conservation trusts, particularly at Elkhorn Slough. The coordination among various federal, state, and local agencies in the study and management of these expansive estuarine environments represent an excellent example of broad-based jurisdictional linkages between government agencies.

Environmental Constraints

As evidenced by the extensive amount of state and local resource management within the beach and slough areas within this segment, sensitive environmental habitat is a primary consideration when evaluating land use options within the North County segment. Sensitive coastal dunes and a contiguous coastal strand are protected as a single dynamic landscape. Numerous rare plant and shoreline fauna are dependent upon this natural community. Inland, the study and protection of estuarine environments contributes to marine mammal and avian habitats, as well as water quality and species diversity.

Operational Constraints

Siting of facilities upland from fore dunes is a physical constraint to the operation of most categories of coastal-dependent research and education activities. In general, the coastal strand is generally inaccessible to development, and inland sites within approximately

2,000 feet of shore are either within prime agriculture areas or are not near adequate road or infrastructure networks. Likewise, few collaborative opportunities or coastal-related support services are present for future developments near the coast (except within the Moss Landing Harbor area).

North County Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | + | + | +/- |
| Environmental | + | + | + |
| Operational | +/- | + | + |

Site Area Description

- No sites identified.

## CONSTRAINTS ANALYSIS

### Monterey County
### Moss Landing Harbor Segment

General Description

The Moss Landing Harbor segment lies within the North County coastal strand. Due to its unique physical attributes and prime location it has been analyzed separately from the remainder of the North County segment. Moss Landing contains a commercial harbor and the capacity to berth larger vessels, particularly those used for ocean research and monitoring. The harbor and berths accessed via the "island" at Moss Landing also serve the commercial fishing fleet there. Much of the land space has been built-out with harbor facilities, services supporting commercial fishing, and coastal-dependent educational and scientific institutions. Major industrial facilities are located immediately east of the harbor area.

Jurisdictional Constraints

The Moss Landing Community Plan recognizes education and scientific facilities as "public/quasi-public" land uses; however, coastal-dependent status is reserved for existing light and heavy industrial facilities. Emphasis on jurisdictional support of commercial fishing and existing industry has not created a serious disadvantage to coastal-dependent research and education; however, a lack of space may have an effect on the viability of new proposals.

Environmental Constraints

Environmental constraints are present both at the harbor and surrounding land areas. As experienced by the MLML, the liquefaction potential along the coastal strand is high. Areas adjacent to estuary wetlands are subject to flooding. Portions of the Elkhorn Slough to the east of the harbor district is a marine mammal haul-out area and unique estuarian habitat. Water quality at the harbor and adjacent areas may inhibit some aquaculture activities. Other concerns, particularly the presence of significant cultural resources, prime agricultural lands, wetlands, and unique flora and fauna must be addressed by regional and on-site studies.

Operational Constraints

Two major coastal-dependent scientific and educational institutions have been located at Moss Landing Harbor. The access to seawater pumping and intake conduits as well as the adjacent harbor facilities and confluence of freshwater and seawater ecosystems lures marine research of all types. Limited space is the principal constraint to the accommodation

of the larger research institutes. Shared space and facilities become necessary at this location.

Moss Landing Harbor Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | +/- | +/- | +/- |
| Environmental | +/- | + | + |
| Operational | - | - | - |

Moss Landing Harbor Site Area Identification Summary

| Site Number | Potential Acreage | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|---|
| 6 | 15 | 5 | 10 | 10 |

Site Area Description

- This site is immediately south of the harbor and is largely undeveloped except for a single water tower on the property. The topography is the highest in Moss Landing with wetlands to the east and the Old Salinas River to the west. Existing infrastructure is available nearby. The new MLML facility is currently planned for this site.

## CONSTRAINTS ANALYSIS

### Monterey County
### Laguna Grande/Roberts Lake Segment

General Description

A lateral coastal strand extends along the entire length of this segment; however, the strand is rather narrow, roughly 500 feet wide. Inland from the sandy shore is Roberts Lake and portions of Laguna Grande Lagoon. Both lagoons are separated from the coast by Route 1. The coastal areas consist of fragile coastal strand vegetation and sand dunes, which are subject to movement via wind erosion.

Jurisdictional Constraints

Jurisdictional policies emphasized within the beach subarea of this segment include provisions for public coastal access (both physically and visually), public recreation, open space, and visitor-serving commercial (i.e., hotels, retail commercial). No specific policy for coastal-dependent activities was expressed in the Public and Coastal Related Use and Access section of the LCP.

Environmental Constraints

The primary constraint is the potential destruction of fragile coastal strand vegetation along sandy beaches and dunes. Highway 1 and adjacent developments and right-of-ways have degraded much of the vegetation in the area of Roberts Lake, as has heavy public use of the beach in areas with undesignated access corridors. As a result exposed dunes readily erode and move. Other sensitive habitats such as grasslands and riparian vegetation are not present within the coastal strand property of potential use by coastal-dependent activities. The California State Parks Department is primarily interested in habitat preservation for this location.

Operational Constraints

Construction issues arise on coast dunes in addition to direct habitat impact or loss. Facility siting becomes problematic when associated needs such as parking and useable space cannot be met along a narrow coastal strand.

Laguna Grande/Roberts Lake Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | +/- | +/- | +/- |
| Environmental | + | + | + |
| Operational | + | + | + |

Site Area Description

- No sites were identified.

## CONSTRAINTS ANALYSIS

### Monterey County
### Del Monte Beach Segment

General Description

This mile-long coastal segment lies between Roberts Lake and the Navy Post Graduate School in the City of Monterey. The segment contains a variety of land uses, including: beach and open sand dune, parkland, undeveloped property, residential housing, an abandoned waste-water processing plant, and U.S. Navy land (also undeveloped). The Navy has proposed a 46,000-square-foot ocean sciences building behind the fore dunes on this property; however no action on this long-standing proposal has occurred.

Jurisdictional Constraints

Local development concerns, other than habitat protection, involve an adequate fresh water supply and visual aesthetics. Public support facilities and security along city beaches and state parkland are also of concern. Jurisdictional priorities tend towards public use and protection of natural resources. Provided that these two jurisdictional priorities are addressed, no major jurisdictional impediments are present for undeveloped parcels within the segment.

Environmental Constraints

Sand dunes with sea fig, Hottentot fig, shore wild flowers, herbaceous annuals, and native grasses are present and require adequate protection and preservation. Rare and endangered species, especially flora, have been identified within the segment. One previously disturbed land area containing three adjacent parcels is generally devoid of significant environmental constraints. The U.S. Navy property would require extensive study; the property contains dune vegetation.

Operational Constraints

Operational constraints are not prohibitive. Available water supply and loss of coastal views via structural design are the major issues. Access to seawater and to other nearby research activities is available.

Del Monte Beach Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | - | - | - |
| Environmental | +/- | +/- | +/- |
| Operational | +/- | - | - |

Del Monte Beach Site Area Identification Summary

| Site Number | Potential Acreage | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|---|
| 7 | 60 | 10 | 20 | 20 |

Site Area Descriptions

- Site 7 is U.S. Navy property with dune vegetation present. It is a prime location for many coastal-dependent research and education land uses; however, environmental concerns may be prohibitive.

## CONSTRAINTS ANALYSIS

### Monterey County
### Monterey Harbor Segment

General Description

This area contains the Monterey Harbor, including Fisherman's Wharf and Wharf #2. The segment includes several coastal-dependent recreational and fishing industry land uses, as well as general commercial and residential buildings. The Monterey Harbor area also contains visitor-serving facilities, such as retail stores, restaurants, and rental equipment.

Jurisdictional Constraints

When considering development at the wharf, coastal-dependent activities are currently restricted to those serving the commercial fishing industry and associated boating uses in the marina and harbor. Size and scale of any proposed facility is severely restricted. Allowable uses of the wharf are those that can reside in existing lot lines and support fishing activities. The Southern Pacific property has been designated for coastal-dependent uses, but examples cited are only those which directly supporting fishing and boating; hence, jurisdictional constraints are high unless revisions to the local coastal program are made. Public access and viewsheds are also a priority, as per the Coastal Act, and restrict the size and design of new facilities.

Environmental Constraints

Active faulting and earthquake activity are known to occur in the immediate area, including liquefaction near the shore. Tsunami inundation areas are present and must be avoided by non-coastal-dependent marine installations. In addition, the U.S. Army Defense Language Institute (the Presidio) at the west edge of the segment is a significant visual and historic landmark. Traffic conditions also affect which activities will be preferred at a given site. Some coastal-related uses may be appropriate if made available for new or additional uses.

Operational Constraints

Due to the existing intensive visitor-serving land use in this area, undeveloped parcel sizes are limited to less than one acre (unless a portion of the Presidio is made available for use). Wharf locations are severely limited and would not support most research or marine monitoring activities. Mariculture would be constrained by space restrictions.

Monterey Harbor Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | + | + | + |
| Environmental | +/- | +/- | +/- |
| Operational | + | + | + |

Monterey Harbor Site Area Identification Summary

| Site Number | Potential Acreage | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|---|
| 8 | 15 | 5 | 15 | 0 |

Site Area Descriptions

The Presidio is a primary location for most coastal-dependent land uses, but is currently functioning as the Defense Language Institute. Mariculture in this largely visitor-serving area is not considered an appropriate land use. No sites were identified which are immediately available due to the local coastal program's policy to allow "marine uses" only. Proposed changes to the local coastal program would be even more detrimental, by eliminating the term "coastal-dependent" and replacing it with "marine uses" that support the marina and wharf. However, certain coastal-related uses would fit within the definition of marine uses, including marine-related retail, commercial, and other support services.

## CONSTRAINTS ANALYSIS

### Monterey County
### Cannery Row Segment

General Description

This segment lies between the Coast Guard harbor and the city limits at the Monterey Bay Aquarium. The inland extent of the coastal zone in this segment is limited to structures and properties within approximately one block of the Cannery Row shoreline. Hopkins Marine Lab, MBARI, Monterey Bay Aquarium are located in Cannery Row.

Jurisdictional Constraints

Marine aquarium and research and education facilities have been supported by local policy. Future growth, however, will be limited by other constraints.

Environmental Constraints

The land area is generally urbanized with coastal areas designated as either public use, private use, or habitat sensitive. Unique marine habitat is under study and preservation by existing constitutions.

Operational Constraints

Space restrictions limit expansion of most coastal-dependent land uses to their existing on-site locations. Hopkins Marine Station is building a two–story laboratory with an aquarium on their premises.

Cannery Row Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | - | - | - |
| Environmental | + | + | + |
| Operational | + | + | + |

Cannery Row Site Area Identification Summary

| Site Number | Potential Acreage | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|---|
| 9 | 5 | 5 | 5 | 0 |

Site Area Descriptions

- Extending existing facilities on limited space at Hopkins Marine Station has been identified as the only potential siting opportunity for new facilities.

## CONSTRAINTS ANALYSIS

### Monterey County
### Del Monte Forest Segment

General Description

The Del Monte Forest coastal segment extends from the Monterey City limits at Cannery Row, past Pacific Grove, Asilomar State Beach, and Cypress Point, to Carmel-by-the-Sea. The area consists of rocky shores and bluffs with numerous recreational and residential land uses currently existing adjacent to the coast. The unique Spanish Bay Country Club, Spyglass, Cypress, and Pebble Beach golf courses are adjacent to the coast. Spanish Bay contains natural areas, specifically dunes, wildflowers, and Monterey cypress.

Jurisdictional Constraints

Local planning decisions are heavily influenced by the preservation and enhancement of existing sensitive natural areas and coastal views, as well as the long-established golfing industry and its associated visitor-serving enterprises. The local jurisdiction would tend to favor activities that support these land uses, versus allowing the redevelopment required to accommodate facilities for coastal-dependent research and education. Off-shore activities, such as kelp harvesting may be allowed; however, no on-shore facilities would be available within this jurisdiction. Displacement of existing land uses would be difficult to reverse based upon the history and economics of existing policies.

Environmental Constraints

As previously mentioned, undeveloped natural areas within State parks or other specified coastal areas contain unique dune habitat and floral species. Shoreline waters support prime sea otter habitat, among other marine mammals, invertebrates, shellfish, and shorebirds. This coastal fringe is considered to be highly resource sensitive. For this reason, resource monitoring programs are the most likely coastal-dependent activity to be allowed within this coastal segment. Many larger near-shore research or educational facilities would not be environmentally appropriate within this scenic coastal area.

Operational Constraints

Unique areas for appropriate for marine studies exist in waters adjacent to the coast. Away from the immediate coastal strip are areas set aside for recreational use or residential/visitor-serving developments. Operational constraints are associated with the lack of available land space. However, areas along the coastal strip are used for scientific and biological field studies (basic research and education), for example, the Carmel Bay Ecological Reserve.

Del Monte Forest Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | +/- | + | + |
| Environmental | +/- | +/- | +/- |
| Operational | - | + | + |

Site Area Descriptions

No sites have been identified.

## CONSTRAINTS ANALYSIS

### Monterey County
### Carmel Segment

General Description

This coastal segment begins at the north edge of the Carmel city limits, and continues south past Pt. Lobos State Reserve and Carmel Highlands, to Malposo Creek. The entire coastal strip has been given a scenic resource designation by local government. Future development is subordinate to maintaining the areas natural scenic quality and character.

Jurisdictional Constraints

Special Treatment Areas have been designated for specific development activities within this segment. Coastal development is restricted to buildout of existing visitor-serving accommodations, with undeveloped areas generally preserved for their natural and scenic values. Because of the abundance of coastal resource-dependent opportunities, field research and education activities may be permitted, provided they meet the criteria for preserving scenic values. Larger coastal research facilities would not be congruent with the goals of this jurisdiction; however, mariculture may be possible in some specified areas.

Environmental Constraints

As previously stated, scenic values and natural areas are the foremost environmental conditions to be retained within this segment. In addition, numerous coastal habitat types have been identified and, to a large extent, preserved as natural areas. Pt. Lobos State Reserve contains Monterey Pine Forest, coastal scrub and grassland, and other unique land features. Grasslands on either side of Route 1 may support coastal-dependent research and education to a limited degree if scaled properly. Urbanized areas at Yankee Point and Carmel Riviera at the extreme southern end of the segment may have potential considering the jurisdictional constraints discussed above.

Operational Constraints

Few operational constraints exist. Water quality and resource abundance is excellent for carrying out work in monitoring research or the cultivation of certain marine species. Constraints to facility siting and design relate to scenic viewshed impact by architectural designs that result in aesthetic alterations. Cliff areas are present adjacent to the water's edge, while near-shore grassland and forest habitats would also restrict development under existing policies. Collaborative research and education efforts are available in this region, with existing research and education facilities at Granite Canyon to the south and Monterey/Pacific Grove immediately north.

Carmel Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | - | + | +/- |
| Environmental | +/- | + | + |
| Operational | - | - | +/- |

Site Area Descriptions

No viable sites have been identified.

## CONSTRAINTS ANALYSIS

### Monterey County
### Big Sur Coastal Segment

General Description

The Big Sur coast lies between Carmel and Pt. Sur and is bounded on on its inland side by the steep western slopes of the Santa Lucia Mountains and the rocky cliffs and offshore rocks along the seaward boundary. Within this segment, nearly fifty separate streams and creeks flow down from these mountains to meet the sea. Coastal redwoods, diverse plants and animals, and scenic vistas make up the Big Sur natural environment.

Jurisdictional Constraints

In general, commercial development is not widespread and is carefully planned prior to being approved and executed. Public participation and an adherence to adopted watershed management plans are to be maintained throughout the process. Preservation of natural landscapes is a primary policy statement in the LCP. Coastal-dependent uses are permitted if no significant adverse visual impact result.

Environmental Constraints

Preservation of scenic resources in perpetuity is a primary county objective within this coastal segment. All future public or private development visible from either route or major viewing areas is prohibited. Environmentally sensitive areas, including marine habitats, are in essentially undisturbed condition. Some are protected by state and federal law. Access in environmentally sensitive areas is limited to low-intensity recreational, scientific, or educational uses. Coastal lagoons and estuaries are to remain undeveloped or may be used by low-intensity research and education activities.

Operational Constraints

Few operational constraints exist. Water quality and resource abundance for carrying on meaningful work in monitoring research, or cultivation of species or habitat. Constraints to facility siting and design relate to scenic viewshed impacts by architectural and aesthetic alterations. Cliff areas would be present for sites adjacent to the water's edge, while grassland or forest habitats may restrict facility size or placement inland of Route 1. Collaborative efforts with other marine research and education activities would be possible with existing facilities at Granite Canyon (located within this segment) and at Monterey/Pacific Grove to the north.

Big Sur Constraints Summary
(+ = highly constrained; +/- = moderately constrained; - = slightly constrained)

| Constraint | Basic Research & Education | Applied Research & Management | Mariculture & Industry |
|---|---|---|---|
| Jurisdictional | - | + | + |
| Environmental | +/- | + | + |
| Operational | - | + | + |

Site Area Descriptions

- No sites beyond those facilities which already exist were identified within this segment.